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Editorial

Mental Health Education and its Awareness

Mohsin Masud Jan
Editor

Mental health is a state of mental wellbeing that enables people to cope with the stresses of life, realize their abilities, learn well and work well and contribute to their community. It has intrinsic an instrumental value and is integral to our well-being.

According to WHO, in 2019, one in every eight people or 970 million people around the world were living with a mental disorder, with anxiety and depressive disorders, the most common. One out of every two people in the world will develop a mental health disorder in their lifetime, according to a large scale study.

Mental health awareness plays an important role in improving the understanding of mental health conditions and increasing access to support. By studying a mental health degree, you will help reduce the stigma around mental health and increase the availability of services that support those suffering from mental health issues.

"It's time to prioritize mental health in the workplace." The Day's goal is to raise awareness of mental health issues and encourage efforts to support mental health. The raising awareness and understanding of mental health conditions and aims to reduce stigma and promote public education around mental health and recognizing its signs and symptoms.

Recognizing the signs and symptoms of depression or other mental health issues is crucial; it can be the initial step toward seeking help and ensuring appropriate treatment for oneself or loved ones.

It's crucial for individuals to seek help for their mental health because our emotional well-being is intricately connected to our overall health. Just as we wouldn't hesitate to seek treatment for a physical ailment, addressing mental health concerns is equally important. By seeking help, we can better understand and manage our mental health, leading to improved overall well-being and a better quality of life.

Symptoms of mental health issues can vary widely but often include changes in mood, such as persistent sadness, irritability, or mood swings. Individuals may also experience changes in behavior, such as withdrawing from social activities, changes in sleep patterns, or engaging in risky behaviors. Physical symptoms can also manifest, such as changes in appetite, unexplained aches and pains, or low energy levels.

Sometimes these changes may be difficult for us to recognize on our own so it's important to listen to our loved ones if they share concerns.

Often, our loved ones can recognize signs of depression in us before we're even aware of it ourselves. Their observations and support can be invaluable in helping us acknowledge and address our mental health challenges.

If you or a loved one is experiencing a mental health issue, it's important not to wait to seek help. Professional support can provide an accurate diagnosis and a personalized treatment plan, including therapy, medication, or both, tailored to your specific needs. Effective treatment can alleviate symptoms such as anxiety, depression, or mood swings, improving your quality of life and overall well-being.

You've got one body and one mind; you get one. That's exactly how I see it. Since you only get one, you've got to take care of it. Make sure you're looking after yourself.

Mental illnesses are common, and many adults with mental health problems. Globally, almost two-thirds of the population with mental illness do not receive treatment from medical professionals[1]. As a result, many people with mental illness remain untreated or poorly treated[2]. Researchers are increasingly emphasizing the importance of mental health awareness as many college students suffer from mental health issues and these challenges affect their lives[3-5] and their academic performance[6].

It is vital to raise awareness of mental health and identify students who may be at risk for mental health-related problems[4,5]. Mental health awareness campaigns at higher education institutions have raised awareness of mental health issues and effectively changed student attitudes towards mental health[3]. Mental health prevention and awareness-raising can normalize seeking help and motivate individuals to take action when they need support[5]. In a previous study conducted on a university campus, almost half of the respondents did not know where to look during a mental health crisis, and only a quarter of students knew about student services[3]. Awareness campaigns can be a great initiative to reduce mental health stigma.

Mental health awareness campaign and communication could address the lack of awareness of services and awareness of stigma. Mental health awareness campaigns have successfully raised awareness and effectively changed attitudes about mental health issues[7]. Mental health interventions and awareness campaigns can motivate individuals to seek counseling, and those who were encouraged to seek help.

The causes of poor mental health are childhood abuse, trauma or neglect. Social isolation are loneliness

experiencing discrimination and stigma, including racism, social disadvantage, poverty. Your life experiences such as stress are a history of abuse, especially if they happen in childhood, biological factors such as chemical imbalances in the brain.

Your gene or family history, a traumatic brain injury, pre-natal (before birth), exposure to viruses, toxic chemicals or other substances such as alcohol and drugs. Having serious medical conditions like cancer, having few friends and feeling lonely and isolated.

You can improve your mental health with the following tips;

Get regular exercise, just 30 minutes of walking every day can boost your mind and your improved your health, eat healthy and regular meal, make sleep a priority, try a relaxing activity, set goals and priorities, practice gratitude and focus on positivity.

More accurate representations in media are a necessary part of changing the public view and helping to reduce stigma. Mental health problems at young age are associated with academic and health disadvantages and timely psychological treatment can have long term benefits.

World Mental Health Day observed annually on October 10th of each year.

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Original Article

Use of Sodium Tetradecyl Sulphate in the Treatment of Venous Malformation of Oral Cavity

Abubakar Saddique, Jehan Alam, Zubair Ahmed, Shoaib Mirza, Gobind Rai and Arsalan Tariq

ABSTRACT

Objective: To observe the efficacy of sodium tetradecyl sulphate as sclerosing agent in venous malformation of oral cavity.

Study Design: Cross sectional study

Place and Duration of Study: This study was conducted at the Department of Oral and Maxillofacial Surgery, Jinnah Postgraduate Medical Centre from September 2023 to March 2024 over six months.

Methods: The clinical efficacy of the treatment was evaluated based on the following grades: "No response," indicating no change in size post-injection; "Mild response labeled as 25% reduction in lesion size, moderate response labeled as 50% reduction in lesion size, good response 75% and 100% reduction considered as complete response.

Results: Regarding response of treatment in 8% of patients no response was observed, moderate response was observed in 36% of cases, 23% patients showed good response and in 33% complete response was observed. Edema was the most common complication among the study patients, in 50.8% patients.

Conclusion: Sclerotherapy with sodium tetradecyl sulfate (STS) is widely recognized as an effective treatment for venous malformations (VMs), boasting minimal side effects and yielding favorable results in many cases.

Key Words: Venous malformation, Sodium tetradecyl sulphate, Oral cavity, Sclerotherapy, Treatment response

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INTRODUCTION

Venous malformations (VM) are congenital lesions commonly found in the oral cavity, with prevalence rates ranging from 14% to 65% in the head and neck region, posing challenges for treatment due to the anatomical complexity of this area[1]. These anomalies, which do not regress spontaneously but rather enlarge with body growth, can undergo rapid expansion triggered by factors such as puberty, pregnancy, infections, trauma, or hemorrhage[2]. They manifest along a spectrum, from isolated skin varicosities to complex lesions infiltrating multiple tissue planes, typically presenting as soft, compressible, non-pulsatile masses with quick refilling[3].

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Symptoms vary based on location, size and may include pain, discoloration (blue skin), infection, swelling, bleeding, ulcers, difficulty in speech and breathing, as well as dysphagia[4,5].

Sodium tetradecyl sulfate (STS) was utilized in the treatment of vascular malformation in the soft palate region, aiming for maximal endothelial damage with minimal thrombus formation[6], ultimately leading to fibrosis and shrinkage of the lesion, as per clinical experience described by previous reports. Patient satisfaction and objective evaluation of lesion size were the endpoints assessed in the study[7].

STS utilized as a sclerosing agent since 1946, effectively treats small varicosities of the legs, lymphatic[8], and venous malformations by inducing endothelial damage, resulting in fibrosis and shrinkage of the lesion without significant thrombus formation, offering a safe, minimally invasive alternative to surgical intervention with satisfactory aesthetic and functional outcomes, thus potentially reducing or obviating the need for surgery[9, 10].

The efficacy of sodium tetradecyl sulfate for venous malformation of oral cavity has not been assessed in our local population and setting. The aim of our study was to assess its efficacy in the treatment of oral cavity venous malformations.

METHODS

A study conducted at the Department of Oral and Maxillofacial Surgery, Jinnah Postgraduate Medical Centre from September 2023 to March 2024 over six months included patients with venous malformation of the oral cavity. The sample size of 61 was determined using OpenEpi Online software, based on a prevalence of complete response of 23.8%, an 80% confidence level, and a 7% margin of error. Female and male gender both having age 18-60 years were enrolled in the research.

Venous malformation in the floor of the mouth, characterized by swelling and bluish discoloration, was diagnosed via clinical intraoral examination, and confirmed through either color Doppler ultrasonography or magnetic resonance imaging (MRI). Sclerotherapy treatment involved direct injections of 3% sodium tetradecyl sulfate, with the dosage tailored to the lesion size, administering 1 millimeter of the sclerosing substance per 1 centimeter of lesion. Injections were repeated at 4-week intervals until a 50% reduction in lesion size was achieved, with a maximum of 6 sessions performed. If no reduction was observed after 2 sessions, further injections were discontinued.

The clinical efficacy of the treatment was evaluated based on the following grades: "No response," indicating no change in size post-injection; "Mild response labeled as 25% reduction in lesion size, moderate response labeled as 50% reduction in lesion size, good response 75% and 100% reduction considered as complete response.

Patients who had previously received treatment and those with incomplete records due to loss of follow-up, as well as medically compromised individuals such as those with diabetes, hypertension, or end-stage renal disease, were excluded from the study. Prior to participation, eligible patients were informed about the study purpose, protocol, and the intended use of their data for research. Demographic information including age, gender, and residential status was collected using a validated questionnaire. Additionally, patients were queried about their medical history, any complications experienced post-treatment, and outcomes such as the site of venous malformation in the oral cavity, initial size, and presence of pain, edema, ulceration, and response to treatment, categorized as no response, mild response, moderate response, good response, or complete response according to predefined criteria.

Data entry and analysis were conducted using SPSS version 27. Descriptive statistics were computed for both quantitative and qualitative variables. A significance level of $p \leq 0.05$ was employed, indicating statistical significance.

RESULTS

Overall, 61 patients were included in this study. The age of patients was 41.22±7.65years. There were more males than females as 41 (67.2%) and 20 (32.8%), respectively. According to area of residence, 31 (50.8%) patients lived in urban area whereas 30 (49.2%) lived in rural area. Buccal mucosa was the most common site among the study patients, as 39 (63.9%). (Table. I).

Table No. 1: Demographic and baseline characteristics of the study patients

Characteristic	Presence
Age (years)	41.22±7.65
Gender	
Male	41 (67.2)
Female	20 (32.8)
Area of residence	
Urban	31 (50.8)
Rural	30 (49.2)
Site	
Buccal mucosa	39 (63.9)
Tongue	22 (36.1)
Mean ± SD. N (%)	

Table No.2: Complications and outcome distribution of the study patients

	N (%)
Complication	
Pain	16 (26.2)
Edema	31 (50.8)
Ulcer	14 (23.0)
Outcome	
No response	5 (8.1)
Moderate	22 (36.1)
Good	14 (23.0)
Complete response	20 (32.8)
N (%)	

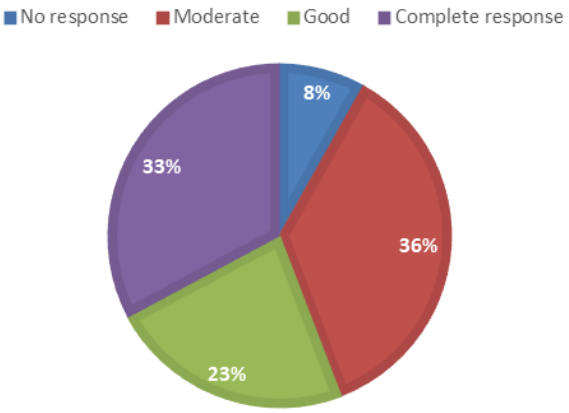

Figure No.1: Outcome

Edema was the most common complication among the study patients, in 31 (50.8%) patients. Regarding response of treatment in 8% of patients no response was observed, moderate response was observed in 36% of cases, 23% patients showed good response and in 33% complete response was observed (Figure. I). (Table. 2).

DISCUSSION

Foam sclerotherapy effectively shrinks venous malformation lesions by inducing temporary or permanent fibrosis of the vessels through damage of endothelial, with little formation of thrombus, ultimately leading to the shrinkage of the lesion[11]. In this study complete response was obtained in 33% of patients with use of STS. Kayalvizhi et al[12] successfully treated a vascular lesion located on tongue towards ventral surface by administering a single injection of STS 1 ml mixed with distilled water 4 ml, resulting in complete reduction of lesion size.

Remarkable response in terms of moderate results was observed in 33% in this study followed by 23% good outcomes. Min et al[13] reported remarkable regression of lesions in two cases of venous malformation in the tongue and left buccal mucosa following treatment with 1% sodium tetradecyl sulfate (STS) injection. Alakailly et al[14] conducted a study on thirteen vascular malformation patients, treating them with 3% STS intralesional injections. Results showed complete resolution in 28.57% patients, good response in 35.7%, moderate response in 14.28%, mild response in 14.28%, and no response in 7.14% patients.

In a case study conducted by Maharjan et al[15] a pyogenic granuloma was successfully treated by administering intralesional injections of undiluted 0.2 ml of sodium tetradecyl sulfate (STS) at a concentration of 30mg/ml. The injections were precisely administered at the base of the pedunculated mass using an insulin syringe. Remarkably, the lesion completely regressed after three treatment sessions, demonstrating no recurrences thereafter. Khaitan et al[16] conducted a study on clinically diagnosed patients with pyogenic granuloma, successfully treating them by administering 0.2-0.5ml of sodium tetradecyl sulfate.

Al-Ghamdi et al[17] successfully treated a case of lymphangioma circumscriptum through intralesional injection of 2 ml of 1% STS, resulting in a remarkable 70% regression of the lesion following two treatment sessions. Shivhare et al[18] have reported that sodium tetradecyl sulfate 3% sclerotherapy demonstrates efficacy in treating various oral lesions, including vascular malformations, pyogenic granuloma, lymphangioma, and mucocele.

Stimpson et al[19] treated 12 patients with venous malformations (VM) in the head and neck region using 3% sodium tetradecyl sulfate (STS) foam sclerotherapy, noting that a single session was generally insufficient for larger lesions, necessitating multiple injections for satisfactory results, while Khandpur et al[20] reported 90-100% regression of venous and lymphatic malformations with direct injection of 3% STS intralesional without radiological guidance.

Limitations: The study might have a small sample size, which could limit the generalizability of the findings to a broader population. Small sample sizes can also reduce the statistical power of the study, making it difficult to detect significant effects.

CONCLUSION

Sclerotherapy with sodium tetradecyl sulfate (STS) is widely recognized as an effective treatment for venous malformations (VMs), boasting minimal side effects and yielding favorable results in many cases.

Author's Contribution:

Concept & Design of Study:	Abubakar Saddique, Jehan Alam
Drafting:	Zubair Ahmed, Shoaib Mirza
Data Analysis:	Gobind Rai, Arsalan Tariq
Revisiting Critically:	Abubakar Saddique, Jehan Alam
Final Approval of version:	By all above authors

Conflict of Interest: The study has no conflict of interest to declare by any author.

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Original Article

Triple Negative Receptor Status in Patients Diagnosed with Carcinoma Breast

Shabbir Ahmed[1], Bushra Ghulam[1], Verdah Azam[1], Sumta Khan[1], Sumera Nighat[2] and Tahira Atiq[2]

ABSTRACT

Objective: To evaluate the frequency of triple negative receptor status in patients diagnosed with breast carcinoma.
Study Design: Cross sectional study
Place and Duration of Study: This study was conducted at the Surgery Department of Nishtar Hospital, Multan from July 2022 to June 2023 in duration of one year.
Methods: A total of 180 patients having age 30-60 years who were presented with suspicion of carcinoma breast were enrolled in study. Data was evaluated and analyzed on IBM SPSS version 23. Chi-square with probability value 0.05 was applied to see association among variables. Demographic and clinical data (age, family history of TNBC, menopausal status and TNBC presence) were presented as mean standard deviation and frequency percentages.
Results: Mean age and size of tumor were 43.46 ± 8.38 and 2.52 ± 0.025 respectively. Triple negative receptor status (TNBC) is the main outcome variable of study which was 21.2% was having TNBC. Menopausal status was positive in majority of patients 77.7%, family history of TNBC was present in 20% patients. Patients were classified in 3 groups according to their status of age, 38.8% patients were having age between 30-40 years, 74 (40.4%) were between 41-50 years and 20.8% between age 51-60 years.
Conclusion: Breast cancer is a concerning issue, especially for younger women. TNBC is a estrogen, HER2 and progesterone receptor lacking subtype of breast cancer.

Key Words: Carcinoma breast, Ductal carcinoma in situ, Metastasis, Triple negative breast cancer.

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INTRODUCTION

Worldwide breast cancer is challenging health problem for female gender. It is one of the leading causes of death among women, although advances in early detection and treatment have improved survival rates in recent years[1]. In the United States, breast cancer is the second most common cause of cancer-related deaths among women, following lung cancer. It accounts for approximately 29% of all cancer cases in women[2].

Breast cancer is a complex disease that can be classified into different subtypes based on its molecular and genetic characteristics[3]. One of the ways to classify breast cancer is through the use of immunohisto-chemical biological markers like progesterone, human epidermal growth factor receptor 2 (HER2) and estrogen[4]. These biomarkers help in determining the appropriate treatment plan for patients. St. Gallen introduced an adjuvant therapy of trastuzumab, endocrine and chemotherapy for breast cancer of primary stage that was based on HER2, PR and ER receptor expression. This approach has been successful in improving the survival rates of breast cancer patients[5,6].

TNBC is a particularly aggressive subtype of breast cancer that is negative for the hormone receptors estrogen and progesterone, as well as the HER2 protein[7]. This means that it cannot be treated with targeted therapies that specifically target these receptors or proteins. Instead, the main treatment options for TNBC include chemotherapy, radiation therapy, and surgery[8]. However, researchers are currently exploring new treatment options for TNBC, including immunotherapy and targeted therapies that work by blocking specific pathways involved in cancer growth and spread[9].

TNBC has a similar metastatic property as other subtypes, but it can proliferate and lead to death in a shorter time period. TNBC is diagnosed in about 10-20% of all breast cancer cases and is more common in young premenopausal females[10]. The frequency of breast cancer varies globally due to factors such as genetic variations, environmental factors, and living status. For example, the incidence of breast cancer in Mozambique is 3.9/100,000 compared to 101.1/100,000 in the US[11].

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Limited studies were conducted on this topic on Pakistani population especially south Punjab region. This study will fulfill the local reference gap in literature and also will help further research in this area.

METHODS

Study was started after ethical approval from hospital board of ethics and written consent from patients or their guardians. Patients were described in detail about study purpose and ensured about their confidentiality. Sampling technique used was non probability consecutive. Sample size of 180 patients was calculated with 18.7% proportion of TNBC, confidence interval 95% and 5% absolute precision. Newly diagnosed cases of cancer having age 30-60 years were included in the study. Previous history of breast surgery, male gender and who refused to give consent were excluded from study.

Physical examination and history was taken from all patients, biopsy sample was taken and sent to laboratory for immunohistochemistry for evaluation of HER2, PR and ER receptors. Triple negative breast cancer stage was also labeled. All specimens were analyzed by a histopathologist having minimum 5 years expertise in this field.

Data was evaluated and analyzed on IBM SPSS version 23. Chi-square with probability value 0.05 was applied to see association among variables. Demographic and clinical data (age, family history of TNBC, menopausal status and TNBC presence) were presented as mean standard deviation and frequency percentages.

RESULTS

A total of 180 female patients, mean age and size of tumor were 43.46 ± 8.38 and 2.52 ± 0.025 respectively.

Table No.1: Demographics (n=171)

Characteristics	Frequency	Percentage (%)
Age	43.46 ± 8.38	
Tumor size	2.52 ± 0.025	
TNBC		
Yes	38	21.2
No	142	78.8
Menopausal Status		
Yes	140	77.7
No	40	22.3
Family History		
Yes	36	20
No	144	80
Stratified Age		
30 to 40 yrs	70	38.8
41 to 50 yrs	74	40.4
51 to 60 yrs	36	20.8

Triple negative receptor status (TNBC) is the main outcome variable of study which was 21.2% (n=38) were having TNBC. Menopausal status was positive in majority of patients 140 (77.7%), family history of TNBC was present in 36 (20%) patients. Patients were classified in 3 groups according to their status of age, 70 (38.8%) patients were having age between 30-40 years, 74 (40.4%) were between 41-50 years and 36 (20.8%) between age 51-60 years. It was observed TNBC associated strongly with previous family history as P values was <0.03. But there was no significance between TNBC and menopausal status as P values was >0.77.

Table No. 2: Association of TNBC and menopause

Menopausal Status	TNBC		Total
	No	Yes	
No	30	9	0.77
Yes	110	28	
Total	140	37	

Table No.3: Association of TNBC and family history

Family History	TNBC		Total
	No	Yes	
No	111	33	0.033
Yes	33	3	
Total	144	36	

DISCUSSION

Among female gender breast cancer is leading cause of mortality worldwide. Its incident varies with age and regional demographics. In this study triple negative receptor status (TNBC) was mainly assessed which was found in 21.2% patients. The study conducted by Patil VW et al[12] on triple-negative breast cancer (TNBC) in the Indian population included a sample size of 683 patients. The researchers found that out of these patients, 136 (19.92%) had positive TNBC, meaning they tested negative for progesterone, human epidermal growth factor receptor 2 (HER2) and estrogen.

In this study mean age of patients was 43.46 ± 8.38 years. In a study Khan et al[13] reported 17.2% TNBC ratio and mean age was 46.26 ± 12.22 years in Pakistani population which is almost same as mentioned in global reports. Another Canadian study by Sajid et al[14] reported mean age below 53 years 11.2% TNBC proportion. Most common subtype was basal like TNBC and commonly 90% found in American and African countries.

Marwan et al[15] found that TNBC was present in 9.3% of their study population, with a median age of 52 years. In this study, 85% of TNBC cases were invasive ductal carcinoma, while medullary carcinoma and invasive lobular carcinoma accounted for 5% each. Positive family history of TNBC was reported in only 9% of patients. Another similar study by Tanja et al[16] observed that most of postmenopausal women about

60.3% at the time of presentation were falling under category of 3rd grade of TNBC about 82.5%, tumor size above 2 cm was observed in 59% of patients.

Ductal carcinoma in situ in association with TNBC was also evaluated by Thika et al[17] and reported 97.9% association with progesterone receptors and estrogen receptors. Studies by Dawson et al[18] and Gluz et al[19] highlight the heterogeneity of triple-negative breast cancer (TNBC) and suggest that the worst prognosis may be mainly associated with a subset of TNBC that express basal cytokeratins or epidermal growth factor receptor (EGFR). A Research has reported that TNBC tumors often have larger sizes at the time of diagnosis, which can be attributed to the aggressive nature of this subtype. TNBC tends to grow more rapidly and may be associated with a higher proliferation rate compared to other subtypes.

In another study Amna et al[20] concluded that breast cancer, especially triple negative disease, has been found to affect younger age groups. This type of cancer is known for its aggressive nature and lack of targeted treatment options.

CONCLUSION

Breast cancer is a concerning issue, especially for younger women. Triple negative breast cancer is a subtype of breast cancer that lacks estrogen, progesterone, and HER2 receptors. Unfortunately, patients with this type of cancer tend to present at advanced stages of the disease, making treatment more challenging.

Recommendations: Further studies on larger sample size and multi-centered concept are required for exact estimation of TNBC frequency and its association with other dependant variables.

Author's Contribution:

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Data Analysis:	Sumera Nighat, Tahira Atiq
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Final Approval of version:	By all above authors

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Original Article

Effectiveness of Del Nido Cardioplegia on Post Cardiac Surgery Ventricular Arrhythmias

Waqas Hamid, Muhammad Ali Khan and Barira Ahmad

ABSTRACT

Objective: To evaluate the effectiveness of DNC cardioplegia as a prophylactic treatment for ventricular arrhythmias associated with cardiovascular surgery in adults.

Study Design: Cross sectional observational study

Place and Duration of Study: This study was conducted at the cardiac surgery department of Chaudhary Pervaiz Elahi Institute of cardiology, Multan from December 2019 to June 2024.

Methods: Study was started after approval from hospital ethical committee. Baseline characteristics, including age, medical history, APACHE II score, and left ventricular ejection fraction (EF), were recorded. Intraoperative data, such as surgery type, operation duration, CBP time, aortic occlusion time (AB), and cardioplegia type, were also collected. Patients were grouped by cardioplegia type. Postoperative data included maximum serum potassium, cardiac enzymes (CK, CK-MB) within 24 hours, EF within 48 hours, incidence of ventricular arrhythmia, and ICU stay length.

Results: The mean post EF% in DNC and STH groups was 61.90±5.48 and 62.40±3.75, respectively. (p=0.682). Mean CK-MB in DNC and STH group was 43.32±4.95 U/L and 33.37±7.13 U/L (p<0.001). The mean CK of the DNC and STH group was 562.30±16.76 U/L and 587.80±19.04 U/L, respectively (p<0.001). The mean length of stay of the DNC group was less than the STH group, 1.50±0.51 days and 2.47±0.50, respectively (p<0.001).

Conclusion: Del Nido cardioplegia reduces postoperative ventricular arrhythmias and preserves myocardial stability. It provides prolonged cardiac arrest with a single dose, shortening bypass time and reducing ICU stay in complex cardiac surgeries.

Key Words: Del Nido cardioplegia, Ventricular arrhythmias, Cardiac Surgery, Hospital stay, Ejection fraction

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INTRODUCTION

Cardioplegia, a vital element of cardiopulmonary bypass (CPB), stops the heart and creates a bloodless surgical field, facilitating precise surgical interventions[1]. Various types of cardioplegia are favored globally. St. Thomas's solution, for instance, is the most commonly used in Europe, with a usage rate of 63.6%. Del Nido cardioplegia (DNC), a cold blood cardioplegia with a higher potassium concentration, was initially developed by Professor Pedro Del Nido at the University of Pittsburgh. Its adaptability for use in the immature myocardium of children instills confidence in its application[2].

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Despite the findings mentioned above, del Nido cardioplegia (DNC) use in adult patients remains limited, as more robust clinical evidence is needed to generalize its application in postoperative myocardial protection for adults[3]. The Cleveland Clinic has recommended using del Nido solution exclusively for valve surgeries, cautioning against its use in coronary artery bypass surgeries due to the uncertain effects of DNC in protecting the myocardium from ischemia[4].

Studies have demonstrated the superiority of delnido cardioplegia in providing myocardial protection in adults[5]. It is well-established that minimizing oxygen demand in the ischemic myocardium through the use of warm terminal blood cardioplegia can enhance metabolic repair and reduce reperfusion injury[6].

Del Nido cardioplegia, initially developed for pediatric cardiac surgery, is gaining popularity in adult cardiac surgery due to its single-dose administration, reduced myocardial ischemic time, and potential myocardial protective benefits[7]. Unlike traditional cardioplegia, Del Nido provides longer-lasting cardiac arrest with less frequent dosing, thereby minimizing interruptions during surgery and possibly reducing myocardial injury and the metabolic derangements that predispose to ventricular arrhythmias. The potential benefits of Del Nido cardioplegia in adult cardiac surgery are

significant, although the evidence regarding its effectiveness in lowering postoperative ventricular arrhythmias in adult populations remains limited and inconclusive[8].

This study aims to evaluate the effectiveness of Del Nido cardioplegia in preventing post-cardiac surgery ventricular arrhythmias compared to conventional cardioplegia techniques. By providing local evidence, it seeks to clarify whether Del Nido cardioplegia offers superior myocardial protection, thereby enhancing patient outcomes, reducing complications, and optimizing resource utilization in cardiac surgery.

METHODS

Study was conducted at cardiac surgery department of Chaudhary Pervaiz Elahi Institute of cardiology, Multan from December 2019 to June 2024. The study planned to evaluate the effect of the Del Nido Cardioplegia (DNC) solution on the incidence of ventricular arrhythmias and its role in providing myocardial protection against postoperative ventricular arrhythmia. Patients aged 18–80 years who underwent conventional cardiovascular surgery with cardiopulmonary bypass using DNC cardioplegia were recruited after obtaining informed consent or proxy consent. Exclusion criteria included off-pump surgery, intraoperative death, or insufficient data. Patients with previous history of cardiac surgery, stroke and renal injuries were excluded. The study adhered to the Declaration of Helsinki and was approved by the hospital's ethics committee.

Baseline characteristics were recorded, including age, medical history, APACHE II score, and left ventricular ejection fraction (EF). Intraoperative data were also collected, such as surgery type, operation duration, CBP time, and aortic occlusion time (AB), and cardioplegia type. Postoperative data included maximum serum potassium, cardiac enzymes (CK, CK-MB) within 24 hours, EF within 48 hours, incidence of ventricular arrhythmia, and ICU stay length

The on-call clinicians administered case-specific treatments based on their clinical judgment and the patient's individual needs. These included the antiarrhythmic medications amiodarone and lidocaine, as well as the beta-blocker metoprolol, to manage the patient's arrhythmia. In addition to these pharmacological interventions, other antiarrhythmic agents were considered and used as necessary, depending on the patient's response and the nature of the arrhythmia. Electroversion was also performed as a therapeutic measure to restore normal rhythm if deemed appropriate. All decisions regarding the treatment choice were made by the attending physician, who carefully assessed the patient's condition, response to previous therapies, and the potential risks and benefits of each intervention.

Frequency and percentage were calculated for categorical variables, mean and standard deviation were calculated for numeric variables, the chi-square test was used to test the significance of two categorical variables, and the student t-test was used to test the difference between two numeric variables. P value less than or equal to 5 per cent considered as significant.

RESULTS

Our study, which included 60 patients, was designed to provide a comprehensive understanding of the patient population. The patients were divided into DNC and STH groups, with 30 patients (50.0%) in each group. The mean age of the DNC and STH group was 64.87±6.72 years and 62.83±6.26 years (p=0.230). In the DNC group, there were 24 (80.0%) males and 6 (20.0%) females, while the STH group had 16 (53.3%) males and 14 (46.7%) females (p=0.028). Importantly, our study found no statistical differences in key variables such as APACHE II, pre-EF (%), diabetes, hypertension, pre-ventricular arrhythmia, AB time, CBP time, K+max, and type of surgery in both groups (p>0.050). This lack of significant differences provides a strong foundation for our study's conclusions. (Table. I).

The mean post EF% in DNC and STH groups was 61.90±5.48 and 62.40±3.75, respectively. (p=0.682). Mean CK-MB in DNC and STH group was 43.32±4.95 U/L and 33.37±7.13 U/L (p<0.001). The mean CK of the DNC and STH group was 562.30±16.76 U/L and 587.80±19.04 U/L, respectively (p<0.001). The mean length of stay of the DNC group was less than the STH group, 1.50±0.51 days and 2.47±0.50, respectively (p<0.001). (Table. 2).

Table No.1: Demographic and baseline variables of the patients

Variable	Group		Test of sig.
	DNC	STH	
Age (years)	64.87±6.72	62.83±6.26	t=1.21, d.f=58, p=0.230
Gender			
Male	24 (80.0)	16 (53.3)	χ^2=4.80, d.f=1, p=0.028
Female	6 (20.0)	14 (46.7)	
APACHE II	13.96±3.75	13.53±3.66	t=542, d.f=58, p=0.653
Pre-EF (%)	60.26±3.64	61.43±3.50	t=-1.26, d.f=58, p=0.211
Diabetes	9 (30.0)	8 (26.7)	χ^2=0.82, d.f=1, p=0.774

Hypertensive	14 (46.7)	12 (40.0)	χ^2=0.271, d.f=1, p=0.602
Pre-Ventricular Arrhythmia	2 (6.7)	1 (3.3)	χ^2=0.351, d.f=1, p=0.554
OP time (hours)	3.17±0.83	4.33±1.12	t=-4.56, d.f=58, p<0.001
AB time (minutes)	83.70±18.54	85.50±13.19	t=-0.433, d.f=58, p=0.666
CBP time (minutes)	100.35±17.77	100.47±11.29	t=-0.031, d.f=58, p=0.975
K+ max (mmol/L)	5.15±2.36	5.56±2.17	t=-0.713, d.f=58, p=0.479
Type of surgery			
Heart valve	15 (50.0)	12 (40.0)	χ^2=1.40, d.f=5, p=0.843
Isolated CABG	4 (13.3)	7 (23.3)	
Aortic aneurysm	5 (16.7)	4 (13.3)	
CABG, Heart Valve	3 (10.0)	3 (10.0)	
Heart valve, aortic Aneurysm	3 (10.0)	4 (13.3)	
CABG, aortic aneurysm	0 (0.0)	0 (0.0)	
mean±s.d, n (%)			

Table No.2: Outcome parameters of the patients

Variable	Group		Test of sig.
	DNC	STH	
Post-EF (%)	61.90±5.48	62.40±3.75	t=-0.412, d.f=58, p=0.682
CK-MB (U/L)	43.32±4.95	33.37±7.13	t=6.27, d.f=58, p<0.001
CK (U/L)	562.30±16.76	587.80±19.04	t=-5.51, d.f=58, p<0.001
Post-Ventricular Arrhythmia	5 (16.7)	5 (16.7)	χ^2=0.000, d.f=58, p=1.000
Length of ICU stay (day)	1.50±0.51	2.47±0.50	t=3.254, d.f=58, p<0.001
Mean ± SD, n (%)			

DISCUSSION

There is no established consensus on the safety and efficacy of del Nido cardioplegia (DNC) in various types of cardiac surgeries. However, our study demonstrated that DNC may play a role in reducing the incidence of postoperative ventricular arrhythmias[9]. Specifically, the overall incidence of ventricular arrhythmias in the DNC group was 16.7%, notably similar to that in the standard cardioplegia (STH) group (16.7%, P=0.040). These findings align with the observations of Amatya et al[10] and Sadr Ameli et al[11], who reported an incidence of ventricular tachyarrhythmia's ranging from 24.4% to 26.6% in Asian populations following cardiac surgery, a result consistent with the outcomes of our study.

The study demonstrated that myocardial enzyme levels, including serum CK-MB and CK, were higher in the DNC group than the STH group, likely due to myocardial injury associated with prolonged operation time and aortic cross-clamp duration in the DNC group. Additionally, research by Charette et al[12] confirmed no significant difference in outcomes between the DNC and STH groups in the 90-minute-plus arm of the study when adjusting for the risk of congenital heart surgery (RACHS) (P = 0.6).

A single dose of del Nido cardioplegia (DNC) perfusion has been demonstrated to effectively maintain myocardial protection for 90 minutes, reducing the need for repeated perfusions and minimizing the number of intraoperative interventions required. Studies conducted by O'Donnell et al[13] and Yerebakan et al[14] highlighted that using DNC solution was associated with significantly shorter aortic cross-clamp times, improving surgical efficiency.

Gambardella et al[15] provided compelling evidence that the DNC solution outperformed traditional multi dose cardioplegia in several critical aspects, including reduced ischemic time, cardiopulmonary bypass (CPB) time, reperfusion fibrillation, and cardiac enzyme levels. These findings underline the advantages of DNC solution in enhancing myocardial protection and improving overall surgical outcomes.

Our study demonstrated that del Nido cardioplegia (DNC) exhibits comparable protective effects on myocardial function and overall cardiac performance, making it a safe and effective option for all cardiac surgeries. Furthermore, research conducted by Guajardo Salinas et al[16] has reinforced these findings by confirming the safety and efficacy of DNC, specifically in coronary artery bypass grafting (CABG) procedures. These combined results highlight the reliability of DNC as a cardioplegic solution across various surgical contexts.

Shu et al[17] reported that the use of Del Nido cardioplegia in patients undergoing cardiovascular surgery may offer several clinical advantages, including a potential reduction in the incidence of postoperative ventricular arrhythmias, a shorter length of stay in the intensive care unit (ICU), and an overall improvement in patient outcomes. This suggests that Del Nido cardioplegia could be a beneficial strategy in optimizing postoperative recovery and reducing complications in the cardiovascular surgical setting.

A study by Ota et al[18] aimed to evaluate the short-term outcomes in aortic valve replacement (AVR) patients. The study included 240 patients, 178 in Group A, where Del Nido solution was used, and 62 in Group B, where whole blood solution was used. The results showed that Group A had shorter aortic cross-clamp and bypass times than Group B.

CONCLUSION

Del Nido cardioplegia reduces postoperative ventricular arrhythmias and preserves myocardial stability. It provides prolonged cardiac arrest with a single dose, shortening bypass time and reducing ICU stay in complex cardiac surgeries.

Author's Contribution:

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Final Approval of version:	By all above authors

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Original Article

Pregnant Females with Polycystic Ovary Syndrome (PCOS) and Effect of Metformin Against Gestational Diabetes Mellitus

Sohail Bashir Sulehria[1], Sohail Anjum[2] and Ghulam Murtaza Hiraj[3]

ABSTRACT

Objective: To study effect of metformin against diabetes mellitus in pregnant females with PCOS
Study Design: Descriptive cases series study.
Place and Duration of Study: This study was conducted at the Kishwar Fazal Teaching Hospital of Amna Inayat Medical College Lahore Period February 1, 2023 to July 31, 2023.
Methods: A follow up of two hundred pregnant women was done for absence or presence of Gestational Diabetes Mellitus until they got delivered. On pre-designed form, efficacy frequency in women having PCOS was recorded. The data analysis was done using Statistical Package of Social Services version 25.
Results: In one hundred sixty six women (83%) metformin efficacy got achieved. On the other thirty four (17%) women could not get efficacy. Seventy one (84.52%) was efficacy for age group between twenty to thirty years. Ninety eight (84.48%) was efficacy for age group between thirty one to forty years. Regarding patient's B.M.I (Body Mass Index) stratification of data was performed. Eighty four (100%) was efficacy for those having normal weight. Sixty five (93%) was efficacy for overweight patients. Thirty nine (59%) was efficacy for obese patients.
Conclusion: In 83% pregnant women metformin for control of plasma sugar had been proved to be effective. Moreover metformin recommendation suggested for PCOS resolution in pregnant women to stay away from GDM. Prevalence, Gestational Diabetes Mellitus, Pregnant Females, PCOS, Metformin, Efficacy
Key Words: Pregnant Females, Polycystic Ovary Syndrome (PCOS), Gestational Diabetes Mellitus

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INTRODUCTION

Irregularities of menses, any ovarian cyst and increased levels of androgens constitute a syndrome called the Poly Cystic Ovary Syndrome (PSOS).[1] If polycystic disease of ovary, it would be a morphological form and if there is predominance of hyperandrogenemia it would be a biochemical variant of it. Follicular development was inhibited along with menstrual changes, ovarian microcysts and anovulation in case of hyperandrogenism.[2] About seven percent women were affected due to this. By 20.7% PCOS was prevalent in Pakistan.[3]

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Body mass index less than thirty of women having PCOS was usually associated with hyperinsulinuaemia, altered tolerance of glucose and insulin resistance (although resistance to insulin may be there in lean females having PCOS.[4]

In a study on patients with PCOS (who were not on metformin), Gestational Diabetes Mellitus (GDM) was concluded to be 44.4% and shown that GDM was more often a disease in pregnant females having history of PCOS and infertility.[5]Many metabolic versions of PCOS for example lipid profiles, sensitivity of insulin and glucose concentration in plasma got controlled by metformin. In comparison with normal women, females having PCOS had more propensities to encounter hypertensive conditions, loss of pregnancy at early stage and GDM against which benefits had been shown if such patients took metformin throughout pregnancy.[6]Studies had concluded that ninety percent patients on metformin did not get GDM while only ten percent got it despite getting metformin. While in some other similar study it was concluded that forty four percent patients on metformin got GDM while 96.65% did not.[7]

Because literature was limited in determining metformin efficacy frequency in women having PCOS

in relation to progression and prevention of GDM, we have opted to conduct this study.

METHODS

After obtaining ethical approval, a descriptive case series was carried out in Kishwar Fazal Teaching Hospital of Amna Inayat Medical College Lahore from February1, 2023 to July 31, 2023. None-Probability Technique of Consecutive Sampling was used. On two hundred and twenty patients taking metformin and having PCOS (considering expected efficacy percentage to be ninety percent), the percentage of metformin efficacy was calculated with confidence level of ninety five percent (four percent error margin). Inclusion criteria: Pregnant women diagnosed PCOS, metformin prescribed and continuously taken throughout pregnancy; Twenty to forty years of age; Parity of any type; Patients after twenty eight to thirty week of pregnancy. Exclusion criteria: Previously diagnosed patients with Diabetes Mellitus (as per record or on history); Gestational Diabetes Mellitus patients (as per record or on history); Hypertension patients (as per record or on history); Hypothyroidism patients (because it is claimed to enhance chances to develop GDM; Patients with more than three miscarriages. Patients from Out Patient Department of Gynaecology and Obstetrics who fulfilled exclusion and inclusion criterions were two hundred and twenty. Consent (informed) was obtained from selected patients for their participation in this research study. Regarding PCOS physical examination after history was performed. All selected patients got followed to see absence or presence of GDM until delivery. Metformin efficacy frequency was obtained using pre-designed proforma while controlling biases via inclusion-exclusion criterions and stratification of data. Version 16 of Statistical Package of Social Sciences (SPSS) was used to enter and analyze data. For patient age (quantitative variable), Standard deviation and Mean were got calculated. BMI and age were stratified to deal with effect modifiers. Chi-square test (after stratification) got applied to calculate significance. A significant p-value stood to be equal or less than 0.05.

RESULTS

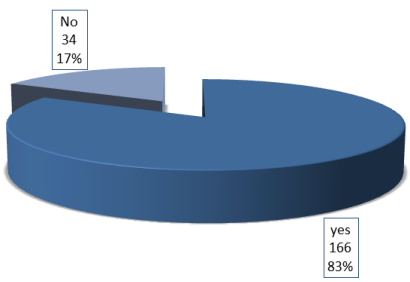

Figure No. 1: Metformin Efficacy Distribution

In one hundred sixty six women (83%) metformin efficacy got achieved. On the other thirty four (17%) women could not get efficacy (Figure 1).

Mean age ranged 33.22 plus/minus 5.33 years (Table 1).

Table No. 1: Descriptive Statistics of patient's age

Age (years)	N	200
	Mean	33.22
	Standard deviation	5.33
	Minimum	17
	Maximum	45

27.34 plus minus 5.83 Kilogram/meter^2 was mean Body Mass Index (BMI) (Table 2).

Table No. 2: Descriptive Statistics regarding Patient's BMI

BMI (kg/m^2)	N	200
	Mean	27.34
	Standard deviation	5.83
	Minimum	17.57
	Maximum	35.15

Regarding patient's age data stratification performed. Seventy one (84.52%) was efficacy for age group between twenty to thirty years. Ninety eight (84.48%) was efficacy for age group between thirty one to forty years. Insignificant difference was noted as p was more than 0.05(Table 3).

Table No.3: Efficacy Comparison Regarding Age

		Age (years)		**Total**
		20-30	31-40	
Efficacy	**Yes**	71	98	169
		84.52%	84.48%	84.50%
	No	13	18	31
		15.48%	15.52%	15.50%
Total		84	116	200
		100.00%	100.00%	100.00%

Chi-Square Test = 0.711 p-Value = 0.69 (Insignificant)
Regarding patient's B.M.I stratification of data was performed. Eighty four (100%) was efficacy for those having normal weight. Sixty five (93%) was efficacy for overweight patients. Thirty nine (59%) was efficacy for obese patients. Significant difference was noted as p was less than 0.05. (Table 4)

Table No. 4: Comparison of Efficacy as per B.M.I

		Body Mass Index			**Sum**
		Normal	**Excess weight**	**Obesity**	
Efficacy	Yes	84	65	39	170
		100%	93%	59%	87%
	No	0 %	3	25	30
		0%	4.9%	41%	12.9%
Sum		84	69	64	200
		100%	100%	100%	100%

Chi-Square Test = 54.512 p-Value = 0.000 (Significant)

DISCUSSION

Gestational diabetes mellitus affects 15-25% pregnancies the world over and hence the prevalent most in pregnant ladies. Hyperglycemia, type 2 diabetes, macrosomia and pre-eclampsia are complications of GDM. Women having GDM have propensity towards different reproductive problems and cancer of breast. Its reproductive and metabolic role had been explored through different life stages.[8]Pregnant women with diabetes having similar risk factors for unwanted outcomes of pregnancy if treated both by metformin and insulin were subjected to lesser weight gain and required lesser insulin for their blood glucose control. Moreover outcomes of neonates regarding macrosomia, hypoglycemia and distress of respiration were also improved as compared with treatment with insulin only.[9]For some meals metformin gives a postprandial glucose control better than that with insulin along with lesser increase in maternal weight but outcomes regarding mother and neonate remained same.[10]Insulin is preferred to treat GDM because metformin and glyburide both cross can cross placenta and hence are not considered to be first line agent. Despite sufficient data documented metformin efficacy and safety in GDM, there is insufficient data regarding far reaching effect of metformin on neonates.[11]If metformin exposure, disorder of fat metabolism and weight gain in later developmental stages can occur in neonates of pregnant ladies having GDM.[12] Women suffering from PCOS are likely to encounter GDM.[13]To reduce or prevent preeclampsia and GDM, incidence metformin has been proved to be highly effective.[14]Besides suppressing Gluconeogenesis in liver, sensitizing insulin, it has antitumor properties too and hence this drug has its wide anti-diabetes role[15] Not only it used in women with infertility and intolerance of glucose for treating PCOS but also in conjunction with other medicine to decrease chances to spontaneously abort fetus or loss of pregnancy in first trimester. Because of its useful role for fetus and mother, it was also recommended for other late stages in pregnancy[16].As per our study in one hundred and sixty six (83%) women metformin efficacy got achieved. On the other hand thirty four (17%) women could not get efficacy because of GDM occurrence. For women having PCOS, after administering isoflavone for twelve weeks Jamilian discovered reasonable improvement in status of hormones, triglycerides, insulin resistance markers, oxidative stress biomarkers.[17]Clinical studies demonstrated that the metformin could efficiently increase sensitivity of insulin, help in losing weight and decrease levels of androgens in PCOS patients as readily as in adolescents.[18]In our study, 84.52% was metformin efficacy for age group between twenty to thirty years. Another research demonstrated the metformin use in thorough pregnancy had an association to reduction in GDM patients having PCOS.[19]Moreover it could minimize preeclampsia risks in these patients as well; A long duration research suggested the metformin use for thirty six months in PCOS patients improved lipoproteins of high-density, BMI and diastolic control of blood pressure.[20] In our current study, 100% was efficacy for those having normal weight, 93% for overweight patients and 59% was metformin efficacy for obese patients.

CONCLUSION

In 83% pregnant women metformin for control of plasma sugar had been proved to be effective. Moreover metformin recommendation suggested for PCOS resolution in pregnant women to stay away from GDM.

Author's Contribution:

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Drafting:	Sohail Anjum, Ghulam Murtaza Hiraj
Data Analysis:	Ghulam Murtaza Hiraj
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Final Approval of version:	By all above authors

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Original Article

Congenital and Pregnancy Related Factors Governing the Risk of Pathological Jaundice in Neonates

Annam Sammie, Saad Muhammad, Junaid Iqbal, Shabeer Hussain Shah, Pir Adil Shah and Najm ul Huda Siddiqui

ABSTRACT

Objective: This study aims to determine the frequency and risk factors for pathological hyperbilirubinemia in our context to guide healthcare policy and practice.

Study Design: Cross sectional study

Place and Duration of Study: This study was conducted at the Neonatal ICU, Ayub Teaching Hospital, Abbottabad from 1st January, 2024 to 31st June 2024.

Methods: One hundred and thirty-seven neonates with neonatal jaundice brought to the NICU were included in the study. Salient demographic characteristics, birth history suspected to be associated with neonatal jaundice and the day of appearance of jaundice were noted. Laboratory investigations were done to assess the causes of jaundice, to aid in diagnosis and evaluate prognosis of treatment.

Results: The study enrolled 137 neonates with neonatal hyperbilirubinemia. Males comprised 51.1% (n=70), while females made up 48.9% (n=67). Neonatal sepsis was the most frequent factor, occurring in 31.39% (n=43) of cases, followed by pre-term birth at 23.36% (n=32) and ABO incompatibility at 18.98% (n=26). Pathologic jaundice was found in 32 (23.4%) of the cases studied. When jaundice was analyzed by age, gender, birth weight, and pre-term birth, no statistically significant association was found ($p > 0.05$)

Conclusion: Pathologic jaundice was found in 32 (23.4%) of the cases studied. It is a more severe form of jaundice and leads to a considerable number of admissions to neonatal ICU. However, most factors responsible for neonatal hyperbilirubinemia are preventable and thus better management of pregnancy and during early neonatal period would address these preventable factors.

Key Words: ABO incompatibility, Bilirubin, Kernicterus, Sepsis.

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INTRODUCTION

Approximately 60%-80% of newborns globally experience neonatal hyperbilirubinemia, or jaundice. In some cases, this condition can lead to serious complications such as kernicterus or encephalopathy, significantly increasing the risk of death, hearing loss, and cerebral palsy.[1] Surviving infants may face long-term neurodevelopmental issues like cerebral palsy, sensorineural hearing loss, intellectual difficulties, paralysis of upward gaze, dental dysplasia, or gross developmental delays.[2]

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Clinical guidelines emphasize the importance of early detection of infants at risk for severe hyperbilirubinemia to prevent these outcomes. The causes and risk factors of neonatal jaundice in developing countries may differ from those in developed countries due to racial, cultural, environmental, and other factors.[3,4]

Various risk factors have been identified in the literature. For instance, a recent study from Bangladesh found that septicemia (28%), asphyxia (20%), prematurity (18%), Rh incompatibility (15%), and intrauterine growth restriction (IUGR) (11%) are common causes. Low birth weight and prematurity were also noted as significant risk factors for neonatal jaundice.[4-5]

A study from Iran identified premature labor (63%), breastfeeding jaundice (35%), ABO incompatibility (24.5%), and G6PD deficiency (12.8%) as major risk factors for severe neonatal hyperbilirubinemia requiring exchange transfusion. Meanwhile, a study from Taiwan found breastfeeding to be the most common cause (38.5%), followed by G6PD deficiency (24%), ABO incompatibility (21.8%), extravascular hemorrhage

(6.5%), bacterial infection (2.2%), hereditary spherocytosis (1.2%), dehydration (1.2%), diabetic mothers (1%), polycythemia (0.7%), and gastrointestinal obstruction (0.7%).[6]

Early identification of infants at risk for severe hyperbilirubinemia is crucial to reducing the burden of this condition in the first 14 days of life. However, the specific risk factors in our setting have not been systematically explored to inform necessary clinical and public health interventions. This study aims to determine the frequency and risk factors for pathological hyperbilirubinemia in our context to guide healthcare policy and practice.[7]

METHODS

A descriptive case series was conducted at the Department of Pediatrics, Ayub Teaching Hospital Abbottabad. After taking a duly signed ethical approval from the institutional review board of the aforementioned hospital, the study was conducted over a period of six months i-e from 1st January, 2024 to 31st June 2024. Sample size of 137 was calculated via WHO sample size calculator; using 15% frequency of Rh incompatibility in neonates with neonatal hyperbilirubinemia, 95% confidence interval and 6% absolute precision using WHO sample size calculations.[8] All the newborns (age up to 4 weeks) of either gender who got admitted with for jaundice or developed jaundice during hospital stay were included. Whereas, children diagnosed with congenital liver diseases, anatomic anomalies of hepatobiliary tract and viral hepatitis were excluded to omit the confounders. Consecutive non-probability sampling technique was used for the sample size completion.

Jaundice in neonatal can be physiologic or pathologic. In our study all the cases that demonstrated any of the following features were characterized as pathological jaundice: (1) Clinical jaundice appearing in the first 24 hours or greater than 14 days of life. (2) Increases in the level of total bilirubin by more than 8.5 µmol/l (0.5 mg/dL) per hour or (85 µmol/l) 5 mg/dL per 24 hours. (3) Total bilirubin more than 331.5 µmol/l (19.5 mg/dL). (4) Direct bilirubin more than 34 µmol/l (2.0 mg/dL). To analyze the risk factors that are associated with pathologic jaundice following factors were studied. (a) Preterm Labor (The birth of a baby at less than 37 weeks gestational age.) (b) Rh Incompatibility: (Rh incompatibility is a condition that occurs during pregnancy if a woman has Rh-negative blood and her baby has Rh-positive blood.) (c) ABO Incompatibility: (Condition that occurs if baby blood group doesn't match the maternal blood group. It is mostly seen in cases where maternal blood group is O and the baby blood group is A, B or AB.) (d) Glucose-6 Phosphate Dehydrogenase Deficiency: (An X-linked recessive inborn error of metabolism that predisposes to hemolysis and resultant jaundice in response to a number of triggers, such as certain foods, illness, or medication.) (e) Intrauterine Growth Restriction: (Intrauterine growth restriction (IUGR) is a fetal weight that is below the 10th percentile for gestational age.) (f) Neonatal Sepsis: (Any infection involving an infant during the first 28 days of life that is documented by positive C-reactive protein-CRP greater than 6 mg/ml.) (g) Neonatal Hypothyroidism: Decreased thyroid hormone production in a neonate, also known as congenital hypothyroidism. In hypothyroidism, the thyroid stimulating hormone (TSH) level is increased and the thyroxine (T_4) level is decreased. The normal value of TSH during first week in a full term neonate is 1-38.9 mU/l and in pre-term infants the value is 0.7-27 mU/l. During the first week of life, total thyroxine level in whole blood is 6.2-22 ug/dl (80-283 mmol/l). (h) Inborn Errors of Metabolism: (These are rare genetic (inherited) disorders in which body can not properly turn food into energy. The defects are usually caused by defects in specific enzymes that help to metabolize parts of food, e.g., galactosemia, maple syrup disease, fructose intolerance etc.) The data collected was recorded in a pre-designed pro forma.

Data analysis: All the data were inputted and processed using SPSS (version 23). For numerical variables such as age, birth weight, and total serum bilirubin levels, measures of central tendency were determined. For categorical variables like gender and different factors contributing to congenital hyperbilirubinemia as defined in operational definitions, frequencies and percentages were computed. The occurrence of jaundice was analyzed in relation to age, gender, pre-term birth, and birth weight to identify any effect modification. A p-value of ≤ 0.05 was considered statistically significant.

RESULTS

The study enrolled 137 neonates with neonatal hyperbilirubinemia. Males comprised 51.1% (n=70), while females made up 48.9% (n=67). Quantitative variables are detailed in tables 1, and so are the frequencies of various factors studied in relation with neonatal hyperbilirubinemia. Neonatal sepsis was the most frequent factor, occurring in 31.39% (n=43) of cases, followed by pre-term birth at 23.36% (n=32) and ABO incompatibility at 18.98% (n=26). Pathologic jaundice was found in 32 (23.4%) of the cases studied. When jaundice was analyzed by age, gender, birth weight, and pre-term birth, no statistically significant association was found ($p > 0.05$) (Table 2 & 3).

Table No. 1: Descriptive statistics of the sample studied

Variable	Mean±SD	Frequency (percentage)
Age (yrs.)	13.91±7.05	
Birth weight (Kg.)	2.81±0.47	
Serum Bilirubin (mg/dL)	17.92±1.67	
Gender (Male:Female)		70(51.09%):67(48.91)
Preterm birth (Yes:No)		32(23.36):105(76.64)
IUGR (Yes:No)		9(6.57):128(93.43)
Rh Incompatibility (Yes:No)		14(10.22):123(89.78)
ABO Incompatibility (Yes:No)		26(18.98):111(81.02)
G6PD Deficiency (Yes:No)		10(7.3):127(92.7)
Neonatal Sepsis (Yes:No)		43(31.39):94(68.61)
Neonatal Hypothyroidism (Yes:No)		2(1.46):135(98.54)
Inborn errors of metabolism (Yes:No)		2(1.46):135(98.54)

Table No. 2: Inferential statistics summarizing association of studied categorical variable with neonatal jaundice.

Variable	Pathological Jaundice		Chi-square value	p-value
	Present	Absent		
Gender (Male:Female)	18:14	52:53	0.44	0.5
Preterm birth (Yes:No)	9:23	23:82	0.53	0.46
IUGR (Yes:No)	2:30	7:98	0.007	1.0*
Rh Incompatibility (Yes:No)	1:31	13:92	2.29	0.18
ABO Incompatibility (Yes:No)	8:24	18:87	0.98	0.32
G6PD Deficiency (Yes:No)	1:31	9:96	1.07	0.45*
Neonatal Sepsis (Yes:No)	12:20	31:74	0.72	0.39
Neonatal Hypothyroidism (Yes:No)	0:32	2:103	0.61	1.0*
Inborn errors of metabolism (Yes:No)	1:31	1:104	0.8	0.41*

Fischer's exact test used to calculate p-value

Table No. 3: Inferential statistics summarizing association of studied categorical variable with neonatal jaundice.

Variable	Pathological Jaundice		t-value	p-value
	Present	Absent		
Age in yrs. (Mean±SD)	14.88± 6.71	13.62±7.15	0.88	0.37
Birth weight in Kg (Mean±SD)	2.89± 0.42	2.78±0.47	1.12	0.26

DISCUSSION

This descriptive cross-sectional study enrolled all neonates who had developed neonatal jaundice as per operational definitions. While all study participants had neonatal hyperbilirubinemia, neonatal sepsis was the most common factor present in 43 (31.39%) neonates. It was followed by pre-term birth (n=32; 23.36%), ABO incompatibility (n=26; 18.98%), Rh incompatibility (n=14; 10.22%), G6PD deficiency (n=10; 7.3%), IUGR (n=9; 6.6%) neonatal hypothyroidism (n=2; 1.46%) and inborn errors of metabolism (n=2; 1.46%). Varying frequencies of factors for neonatal hyperbilirubinemia have been reported in the literature. For example, a study by Sciuto and colleagues reported that neonatal hyperbilirubinemia was present in 19% of their study cohort.[9] The common factors for neonatal hyperbilirubinemia in that study were Rh and ABO incompatibility, as well as glucose-6-phosphate dehydrogenase (G6PD) deficiency.[9] In a study from Nepal 18,985 newborn infants were evaluated for neonatal jaundice its incidence was reported to be 29.3 per 1000 live births.[10] The researchers reported that Male sex, high birth weight, breastfeeding patterns, warm air temperature, primiparity, skilled birth attendance, place of delivery, prolonged labor, oil massage, paternal education, and ethnicity were significant risk factors (p-values<0.01). After multi-variable adjustment, sex, birth weight, difficulty feeding, prolonged labor, primiparity, oil massage, ambient air temperature, and ethnicity remained important factors.[10] In contrast, this study focused on a limited number of variables and found that no statistically significant association existed between neonatal jaundice and age, sex, pre-term birth and birth-weight.

Interestingly, a study from Kerala, India reported a statistically significant relationship between hyperbilirubinemia and LBW, preterm delivery, PPROM, breast feeding, neonatal infection,

instrumental delivery and presence of GDM and IUGR.[11] The researchers in that study defined neonatal hyperbilirubinemia as a serum bilirubin level more than 10 mg/dl and their study cohort consisted of 140 singleton deliveries.[11] A study from Makkah, Saudi Arab reported that ABO incompatibility (31.6%) and G6PD deficiency (10.5%) frequently result in neonatal jaundice in Makkah.[12] In contrast, neonatal sepsis was the most common cause of neonatal hyperbilirubinemia in this study. A study from Iran reported that the most common major risk factors associated with neonatal hyperbilirubinemia were significant weight loss (27.5%), jaundice visible in the first 24 hours (16.3%), history of treatment with phototherapy and exchange transfusion in sibling (14.8%), Gestational age of 35 to 36 week (9.9%), ABO incompatibility (9.2%), RH incompatibility (3.3%) and G6PD deficiency (3.33%), and the most common minor risk factors were age over 25 years (51.4%), male (49.7%), history of hyperbilirubinemia in sibling (22.3%), diabetic mother's infants (1.5%).[13]

Interestingly, a recently published research from Hyderabad, Pakistan reported that most common risk factor was the sepsis 46.69%, following by birth asphyxia was in 11.40%, hypoglycemia 11.40%, hypothermia 07.89% and hypoalbuminemia was found in 0.87% cases and in 9.64% cases risk factors were unknown.[14] This indicates that neonatal sepsis is still a huge problem and a significant percentage of neonatal hyperbilirubinemia can be reduced by prevention of neonatal sepsis. A study from Kerala India also reported that sepsis contributed significantly to the causation of neonatal jaundice. The researchers in that study reported that common causes for neonatal jaundice were low birth weight 58.44%, blood group incompatibilities 58.86%, infections 33.33%, hypoxia 22.07%, refusal or difficulty in feeding 18.61%.[15]

Study limitations: The study was conducted on a limited number of uni-centric patients: this decreases the generalization of the inferences made. Thus, higher evidence generating multi-centric studies are invited to help postulate best practice guidelines regarding management of the disease.

CONCLUSION

Pathologic jaundice was found in 32 (23.4%) of the cases studied. It is a more severe form of jaundice and leads to a considerable number of admissions to neonatal ICU. However, most factors responsible for neonatal hyperbilirubinemia are preventable and thus better management of pregnancy and during early neonatal period would address these preventable factors associated with neonatal hyperbilirubinemia.

Author's Contribution:

Concept & Design of Study:	Annam Sammie
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Revisiting Critically:	Annam Sammie, Saad Muhammad
Final Approval of version:	By all above authors

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Original Article

Gallbladder wall Thickness at Preoperative Sonography and its Impact on Operative Outcome of Laparoscopic Cholecystectomy

Muhammad Ibrahim Shuja, Faiz ur Rahman, Aamir Ali Khan, Muhammad Kashif, Zia Ullah and Muhammad Ali

ABSTRACT

Objective: To explore the Gallbladder wall thickness at Preoperative Sonography and Its Impact on Operative Outcome of Laparoscopic Cholecystectomy.

Study Design: prospective observational study

Place and Duration of Study: This study was conducted at the department of general surgery Bacha Khan Medical Complex/Gajju Khan Medical College-SWABI from July 2023 to February 2024.

Methods: after taking permission from the ethical board of the institute. A total of 354 participants already diagnosed gallbladder diseases and planned for laparoscopic cholecystectomy were enrolled. Participants were categorized into four categories based on the gallbladder wall thickness determined by ultrasonography: normal thickness, which was up to 2 mm, mild thickness, which was 3–4 mm, moderate thickness, which was 5–6 mm, and severe thickness, which was more than 6 mm. A thickness of up to two millimeters was regarded as normal.

Results: The groups with moderate and severe wall thickness experienced higher conversion rate as well as intraoperative or post-surgical complications. The group that is significantly thicker has the highest incidence of complications. Consequences were seen in 100% of individuals in the significantly thickened group. Higher thickness groups had longer operating times and longer hospital stays after surgery. Gallbladder wall thickness as well as conversion rate, surgical complications, and duration of stay after surgery were all statistically significantly correlated.

Conclusion: It was concluded from our study that Gallbladder wall thickness at Preoperative Sonography results in a higher incidence of conversion to open procedures, increased surgical times, more intraoperative and postoperative problems, and a longer duration of hospital stay after surgery.

Key Words: Gallbladder; Wall thickness; Preoperative Sonography; Laparoscopic Cholecystectomy

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INTRODUCTION

Open cholecystectomy has been replaced by elective laparoscopic cholecystectomy as the gold standard treatment for symptomatic gallstone disease.[1] Patients who have gallstone disease symptoms might be diagnosed with cholecystitis based on the thickness of their gallbladder wall.[2] The gallbladder wall Typically assessed by ultrasonography (USG) less than 3 mm.[3]

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In 93% of individuals, USG measures the gallbladder wall thickness with an accuracy of within 1 mm. Cholecystitis is suggested if the gallbladder wall is thicker than 3 mm. This is the characteristic of cholecystitis, even though it is also present in many other disorders, such as gallbladder cancer & adenomyomatosis, where the gallbladder's width is directly related to the underlying pathology[4]. Predicting conversion and complications from laparoscopic cholecystectomy is crucial for gallstone disease treatment[5]. The preferred method for detecting gallstones is now abdominal ultrasonography, which is also helpful for recognizing any related biliary dilation that may be present. Due to its superficial position and lack of overlaying intestinal gas, GB diseases are frequently detected by USG. Although this finding is seen in a variety of different medical situations, gallbladder wall thickening is a common sonographic finding that has generated a lot of interest since it is thought to be a defining characteristic of acute cholecystitis.[6] One of the main determinants of the kind

of surgical surgery used to treat gallstone disease is the thickness of the gallbladder wall. The purpose of this study was to determine Gallbladder wall thickness at Preoperative Sonography and Its Impact on Operative Outcome of Laparoscopic Cholecystectomy.

METHODS

The current prospective observational study was carried out at the department of general surgery Bacha Khan Medical Complex/Gajju Khan Medical College-SWABI from July 2023 to February 2024 after taking permission from the ethical board of the institute. A total of 354 participants already diagnosed with gallbladder diseases and having planning for laparoscopic cholecystectomy were enrolled in the current study. Pregnant women and patients diagnosed with biliary enteric fistula, cholangitis, carcinoma gallbladder, acute biliary pancreatitis, perforated gallbladder, gallbladder polyps and portal hypertension were excluded. Information's like name of patients, sex, age, admission date, surgery and discharge date are among the basic patient information that were gathered. A thorough medical history, with particular attention to the patient's biliary colic symptoms, past colic episodes, jaundice, pancreatitis history, Co-morbidities, such as diabetes mellitus, hypertension, major diseases and past symptoms, abdominal examination, and general physical assessment were examined. All patients had symptoms that pointed to either simple or complex gallstone disease, including fever, flatulence, and discomfort in the right hypochondrium or epigastrium that became worse after eating. A sinologist performed a comprehensive examination on every individual and used abdominal ultrasonography to further assess them. Along with other indicators of gallstone disease, the thickness in the wall was evaluated at the fundus level. Participants were categorized into four groups based on the wall thickness of gallbladder determined by ultrasonography: normal thickness, which was ≤2 mm, mild thickness, which was 3–4 mm, moderate thickness, which was 5–6 mm, and severe thickness, which was more than 6 mm. A thickness of up to two millimeters was regarded as typical. Patients with gallstone disease were recommended to have a laparoscopic cholecystectomy. Based on the thickness of the gallbladder wall, those who were willing to have surgery were then split up into four groups. Depending on the patient's presentation and preferences, laparoscopic cholecystectomy procedures were then scheduled for either the same sitting or a separate time. Their length of hospital stay, rate of conversion to open procedure, duration of operation, and intraoperative results were all documented. Adhesions, bleeding, common bile duct damage, bile leak after surgery, and surgical site infection are the general categories into which intraoperative and postoperative problems were categorized. All the data was analyzed by using SPSS version 24.

RESULTS

A total of 356 individuals were enrolled in the current research age ranged from 18 to 90 years. 94(26.48%) of the subjects were between the ages of 41 and 50, 43 (12.0%) were older than 60 years. The average age at presentation was 45.01. With a standard deviation of 12.64 years, the mean age of men was 46.64 years, while the mean age of females was 45.01 years, with a standard deviation of 13.97 years. 93 (26.71%) of those included in our research who had laparoscopic cholecystectomy were men, and 263 (73.87%) were women (figure1).12 (4.51%) of the female participants and 10 (10.7%) of the male individuals had complications. In moderately thickened group the frequency of conversion was 40%. In the group of participants with highly thickened gall bladder walls, the frequency of conversion was 100%, whereas in patients with normal gall bladder wall thickness, it was 6.67%. The conversion rate and gallbladder wall thickness have a positive and statistically significant connection (p=value<0.0001). The prevalence of conversion to open procedure and the correlation between gallbladder wall thicknesses is shown in table 1. 6% of the participants had intraoperative or postoperative complications. In the highly thickened group, the complications frequency was 100%, whereas it was 33.33% in the moderately thickened group. All individuals in the severely thickened group had complications. A significant statistical relationship of intraoperative and postoperative complications with gallbladder wall thickness was observed (p-value= <0.0001). The group that was considerably thickened had a longer mean operative time (126.4 mins), followed by the group that was moderately thickened (89 minutes), and the group that was normal had the shortest (52.97 minute). There is a statistically significant relationship between mean operating time and gallbladder wall thickness. The group with the thickest gallbladder wall, 11 (±10.12) days, had the longest postoperative hospital stay, the group with the moderate thickening (4.8 days), and the group with the normal gallbladder thickening had the shortest mean postoperative stay in hospital 2.8 (±1.45) days. Wall thickness of gallbladder and hospital mean postoperative stay had a significant statistical relationship (p-value= <0.0001). Time of surgery and postoperative stay in hospital and its association with gallbladder wall thickness is represented in table 2 while intra and postoperative complications in each group are represented in table 3.

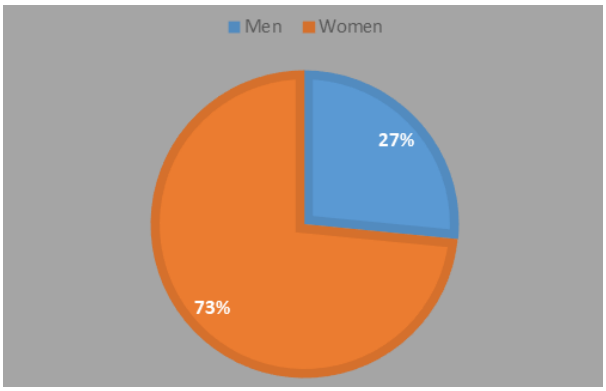

Figure No. 1: Percentage of Male and Female of in the study population.

Table No. 1: The prevalence of conversion to open procedure and the correlation between gallbladder wall thickness

Thickness of	Total no participants	Conversion	
		Yes (%)	No (%)
gallbladder			
Normal	248	2(11.1)	246(72.78)
Mild	86	4(22.22)	82(24.26)
Moderate	17	7(38.8)	10(2.9)
Sever	5	5(27.7	0
Total	356	18(100)	338

Table No. 2: Operative time and postoperative hospital stay and its association with gallbladder wall thickness

Thickness of gallbladder	Duration of surgery Mean	Duration of Hospital stay after surgery Mean
Normal	52.98	2.80
Mild	60.60	3.0
Moderate	89	4.8
Sever	126	11
Value of p	Less than .0001	Less than .0001

Table No.3: Intra and postoperative complications in each group

Complications	Thickness of gallbladder				
	Normal	Mild	Moderate	Severe	Total
Normal	243	80	9	0	332
Leakage of bile	1	1	1	2	5
Hemorrhages	0	1	4	2	7
Jaundice	2	2	0	0	4
Infected wound	2	2	2	2	8
Total	248	86	16	6	356

DISCUSSION

For gallstone disease, the use of laparoscopic cholecystectomy is currently the gold standard surgical treatment. However, a small percentage of them still end up becoming open operations because of poor surgical anatomy visibility brought on by inflammation, thick adhesions, irregular anatomy, as well as any other reason. Intraoperative or postoperative problems are rare in them. Both the surgeon and the patient's result may benefit from the identification of predicted indicators for conversion and complications.

In terms of demography, in our study female were dominant (73%) as compared to male (27%) in the ratio of 1:2.8, which is comparable to a study conducted in India by Chandra et al[7], where the sex ratio was 1:1.64[6]. but was not similar with research conducted in the We studies.[8] Gallbladder wall thickness is an essential component for laparoscopic cholecystectomy, however other preoperative criteria have been discovered in the scientific literature for predicting of consequence. For gallbladder wall thickness, a professional radiologist uses ultrasound to determine the cutoff threshold, which is 2 millimeters. According to the current study's findings, the possibility of conversion to an open surgery and the likelihood of both intraoperative and postoperative problems rise with the thickness of the gallbladder wall. In a similar vein, it increases the length of the hospital stay and the operating time. There was a 4.28% total conversion percentage to open procedure. It is 5–10% less than the published literature[9] and comparable to a Chandra et al research.[7] Similar to previous research, there was a positive correlation and a greater conversion rate in the group with thicker gallbladder walls. Dense inflammatory adhesions that developed subsequent to cholecystitis or empyema gallbladder were the cause of conversion in most instances. These adhesions caused conversion and prevented safe dissection. Both intraoperative and postoperative complications were accounted in the current study. Compared to intraoperative problems, postoperative complications appeared more common. Postoperative problems occurred 4% which is somewhat lower than the available literature.[4]

Only 4 individuals required retrograde endoscopic cholangiopancreatography (ERCP)-guided stenting; the most frequent postoperative complication was bile leak, which resolved on its own after the 10th postoperative day. The current research also considered postoperative duration of stay and surgical time as criterion. The group with normal wall thickness had the shortest mean operative duration, at 52.97 minutes with a standard

deviation of 9.27 minutes. Similar to the literature, the mean operating time increased as the thickness of the gallbladder wall increased.[10] the postoperative duration of the stay, which measures the outcome after surgery, was another factor that became part of this research. The group with the normal gallbladder thickness of the wall had the shortest mean postoperative duration (2.8 days with Standard deviation of 1.45 days), whereas the group with the substantially thickened gallbladder had the longest (11 days with SD of 10.12 days). Surgical site infection, postoperative discomfort, and postoperative bile leak were the contributing causes to the lengthening of stay. The duration of stay after surgery is somewhat longer than what has been documented in the literature.[10]

CONCLUSION

It was concluded from our study that Gallbladder wall thickness at Preoperative Sonography results in a higher incidence of conversion to open procedures, increased surgical times, more intraoperative and postoperative problems, and a longer duration of hospital stay after surgery. Wall thickness of gallbladder, rate of complication, conversion rate, intraoperative duration, and postoperative hospital stay all exhibited positive correlations in our research.

Author's Contribution:

Concept & Design of Study:	Muhammad Ibrahim Shuja
Drafting:	Faiz ur Rahman, Aamir Ali Khan
Data Analysis:	Muhammad Kashif, Zia Ullah, Muhammad Ali
Revisiting Critically:	Muhammad Ibrahim Shuja, Faiz ur Rahman
Final Approval of version:	By all above authors

Conflict of Interest: The study has no conflict of interest to declare by any author.

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Original Article

Assessment of Severity of Diabetic Foot Ulcers Using Diabetic Ulcer Severity Score

Aamir Ali Khan, Muhammad Kashif, Zia Ullah, Muhammad Ali, Muhammad Ibrahim Shuja and Faiz ur Rahman

ABSTRACT

Objective: Assessment of Severity of Diabetic Foot Ulcers Using Diabetic Ulcer Severity Score.

Study Design: A Prospective study

Place and Duration of Study: This study was conducted at the Department of General Surgery in Bacha Khan Medical Complex/Gajju Khan Medical College-SWABI from 1st November 2022 to 30 April 2023.

Methods: After taking approval from the ethical board of the institute. A total of 96 individuals were enrolled in this study and their diabetic ulcer severity score was assessed and they were followed up at three and six months. The information collected was input into a Microsoft Excel spreadsheet, and the proportion of healing or amputation was determined using percentage analysis.

Results: In this study a total of 96 individuals with diabetes mellitus who have foot ulcers were enrolled. Out of which 72(75%) were female and 24(25%) were male. Complete healing was experienced by 100% of individuals with diabetic ulcer severity scores of 0. While 16% people who had a diabetic ulcer severity score of 1 suffered minor amputation, 84% of them experienced ulcer healing over the 6-month follow-up period. 54% of individuals with a score of 2 achieved full ulcer healing while 29% of patients with a diabetic ulcer severity score of 2 experienced minor amputation and 17% underwent major amputation. In contrast to 6.25% of the individuals who experienced full ulcer healing throughout the follow-up period, 56.25% of participants with a diabetic ulcer severity score of 3 experienced minor amputation. Amputation was performed on all patients with a diabetic ulcer severity score of 4. When the results of the participants without pedal pulses were examined separately it became clear that majority of them (91.17%) were amputated. Active bone involvement was noticed 30% of the participants in which 68.9% have been amputated.

Conclusion: Our study concluded that the frequency of diabetes complications, such as the risk and occurrence of diabetic foot ulcers, has grown over the last several decades in correlation with the rising number of individuals receiving a diabetes mellitus diagnosis.

Key Words: Assessment; Diabetic Foot; Ulcers; Severity Score

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INTRODUCTION

The global prevalence of diabetes mellitus is 8.8% worldwide, making it one of the most prevalent metabolic diseases. Diabetic foot is described as "an ulceration of the foot (distally from the ankle and including the ankle) associated with different grades of ischemia associated infection and neuropathy.[1] It causes significant morbidity and higher mortality because of the sequelae linked to it.[2] It affects quality of life, and if early assistance is not received, the damaged area or limb is often amputated.[3] Lower limb amputations are mostly caused by ulceration, which occurs before the amputation.[4]Ulcers heal more quickly when glycemic management, foot infection prevention, and ischemia minimization are maintained.[5] Another crucial factor in the effective treatment of diabetic individuals with foot ulcers is ulcer depth.[6] There are several grouping approaches that take into consideration various aspects, including the ulcer's location, depth, and correlation with infection, ischemia, and neuropathy.[7]Deep ulcers, peripheral vascular disease, and the existence of other co-morbidities including hypertension and addictive behaviors like smoking and drinking all affect how well ulcers are managed.[7] Between 15 and 20 percent of diabetes individuals get foot ulcers at some point in their lives, which lowers their quality of life and causes

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serious health problems. It leads to a significant use of medical resources.[8] Numerous Classification and scoring approaches for foot ulcers have been created and are now in use. For instance, the Brodsky Depth Ischaemia classification, the University of Texas Diabetic Wound Classification system, and the Wagner Diabetic Foot Classification.[9] The aforementioned rating schemes are intricate and ineffective at forecasting patients' long-term results. The Diabetic Ulcer Severity Score (DUSS) attempts to rectify those shortcomings. Beckert et al.[10] proposed a novel scoring system called the Diabetic Ulcer Severity Score (DUSS). It is one of the recently developed wound-based ulcer classification systems that requires validation in our setup. This grading system will be a very helpful tool for people who need amputations to make decisions since it can anticipate amputation rates. Therefore, this study aims to evaluate the severity of diabetic foot ulcers using the diabetic ulcer severity score (first described by Beckert and colleagues) and correlate it with the results that will ultimately aid in improving the treatment and counselling of such individuals.

METHODS

The current prospective study was conducted at the department of general surgery in Bacha Khan Medical Complex/Gajju Khan Medical College-SWABI from 1st November 2022 to 30 April 2023 after taking approval from the ethical board of the institute. A total of 96 individuals were enrolled in this study and their diabetic ulcer severity score was assessed and they were followed up at three and six months. Individuals with diabetes mellitus who have one or more foot ulcers and all diabetic foot ulcers were included while Individuals with diabetes who have foot venous ulcers were excluded. Each the individual's diabetic ulcer severity score was determined using the formula as shown in table 1. The Diabetic Ulcer Severity score was determined by adding the four individual values. A subject may receive a minimum score of 0 and a maximum score of 4. Two follow-up visits were conducted at three and six months to evaluate the ulcer's healing, determine if it has healed or not, to find whether the patient has had amputation earlier (at which point each participant will be considered to have accomplished this study). Epithelialization of the ulcer with primary intention or skin grafting was defined as healing. Amputations above or below the knee were considered significant, whilst amputations to the toe or forefoot were considered minor. The information collected was input into a Microsoft Excel spreadsheet, and the proportion of healing or amputation was determined using percentage analysis.

RESULTS

In this study a total of 96 individuals with diabetes mellitus who have foot ulcers were enrolled .Out of which 72(75%) were female and 24(25%) were male (Fig 1). The mean age of the study participants was 59.6 years (range 35-90 years).The most prevalent age group among the participants were 55 to 60 years (20.8%).Age wise distribution of the study population is represented in table 2.

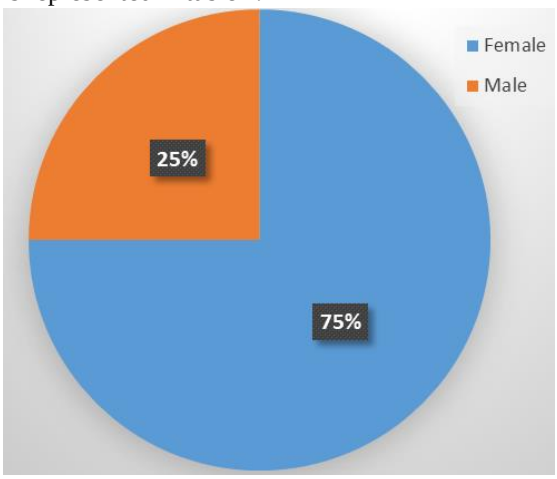

Figure No. 1: Percentage of female and male

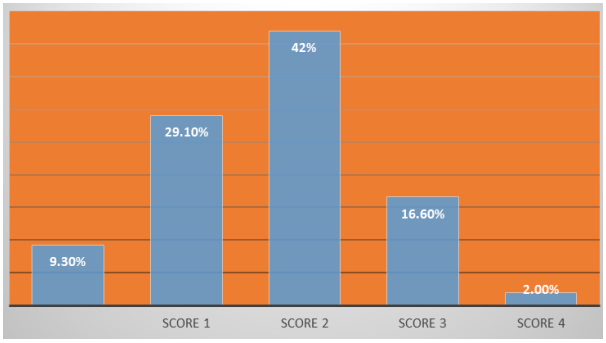

Figure No. 2: Diabetic ulcer severity score of the individuals of the study

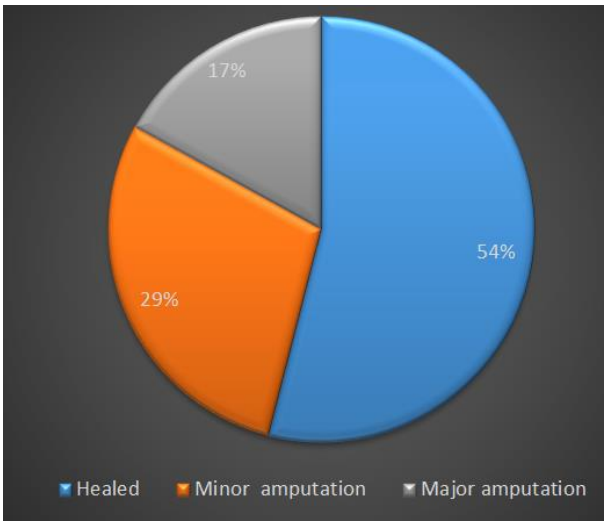

Figure No. 3: Depiction of the study population with respect to outcome

The study revealed that 42% of the participants had a diabetic ulcer severity score of 2, followed by individuals with scores of 1 (29.1%), 3, (16.6 per cent), 0 (9.3%) and score 4 (2.0%) (Figure 2). Complete healing was experienced by 100% of individuals with diabetic ulcer severity scores of 0. While 16% people who had a diabetic ulcer severity score of 1 suffered minor amputation, 84% of them experienced ulcer healing over the 6-month follow-up period. 54% of individuals with a score of 2 achieved full ulcer healing while 29% of patients with a diabetic ulcer severity score of 2 experienced minor amputation and 17% underwent major amputation. (figure 3) In contrast to 6.25% of the individuals who experienced full ulcer healing throughout the follow-up period, 56.25% of participants with a diabetic ulcer severity score of 3 experienced minor amputation. Amputation was performed on all patients with a diabetic ulcer severity score of 4. When the results of the participants without pedal pulses were examined separately it became clear that majority of them (91.17%) were amputated (table 3). Active bone involvement was noticed 30% of the participants in which 68.9% have been amputated (table4)

Table No. 1: Each individuals diabetic ulcer severity score

Features	Score of zero	Score of 1
Site of ulcer	Toe	Foot
Number of ulcer	Single	Multiple
Peripheral pulses /Doppler	Present	Absent
Osteomyelitis X-ray foot	Absent	Present

Table No. 2: Age distribution of the study population

Age in years	N(%)
35 to 40	6(6.25)
40 to 45	5(5.20)
45 to 50	6(6.25
50 to 55	12(12.5)
55 to 60	20(20.8)
60 to 65	16(16.66)
65 to 70	12(12.5)
70 to 75	12(12.5)
75 t0 80	5(5.20)
80 to 85	1(1.04)
85 to 90	1(1.04)
Total	96(100)

Table No. 3: Distribution of Study population based on absent pedal pulses t and its outcomes

Results	N (%)
Healed	3(8.8)
Minor amputation	19(55.88)
Major amputation	12(35.29)
Total	34

Table No. 4: Distribution of Study population based on bone involvement and its outcomes

Results	N (%)
Healed	9(31)
Minor amputation	15(51)
Major amputation	5(17.2)
Total	29

DISCUSSION

In Germany in 2006.Beckert and his colleagues first introduced the diabetic ulcer severity score as a prognostic scoring system for diabetic foot ulcers. Their research came to the conclusion that the main reasons this score matters are to enhance communication between medical professionals and to enable an appropriate course of therapy in relation to ulcer grading. [11] In this study a total of 96 individuals with diabetes mellitus who have foot ulcers were enrolled. Out of which 75% were female and 25% were male. A study was conducted by Kumar, Shiva,et al[12] in in their study majority participants were male (81%) this is not similar to our study. In the current study the most prevalent age group among the participants were 55 to 60 years (20.8%) which is similar with the findings of the previous study.[12] The study revealed that 42% of the participants had a diabetic ulcer severity score of 2, followed by individuals with scores of 1 (29.1%), 3, (16.6 per cent), 0 (9.3%) and score 4 (2.0%) these findings are similar with the previous studies [13] Of all the patients included in this study, 54% had a probability of ulcer healing. This contrasted with the study by Beckert et al[11], which showed 57% recovery for score 4 and 93% healing for score 0. However, the outcome was similar to research, which was carried out in Bangalore by Shashikala et al.[14] 31% of the patients studied experienced some sort of amputation, with 51% experiencing minor amputation and 17% undergoing severe amputation. The study's findings indicated that the disease's outcome gets worse as the score increases, which is consistent with previous studies.[11,15] When the results of the participants without pedal pulses were examined separately it became clear that majority of them (91.17%) were amputated. This is crucial to understand since the results suggest that a patient's outcome is affected if they have a component of peripheral vascular disease. Vasculopathy is recognized to result from diabetes mellitus effects on the vasculature. In the present study Active bone involvement was noticed 30% of the participants in which 68.9% have been amputated. Therefore, this research highlights even more how crucial it is to identify osteomyelitis or bone involvement in Individuals with diabetic foot, since this ultimately influences the prognosis.

CONCLUSION

Our study concluded that the frequency of diabetes complications, such as the risk and occurrence of diabetic foot ulcers, has grown over the last several decades in correlation with the rising number of individuals receiving a diabetes mellitus diagnosis.

Author's Contribution:

Concept & Design of Study:	Aamir Ali Khan
Drafting:	Muhammad Kashif, Zia Ullah
Data Analysis:	Muhammad Ali, Muhammad Ibrahim Shuja, Faiz ur Rahman
Revisiting Critically:	Aamir Ali Khan, Muhammad Kashif
Final Approval of version:	By all above authors

Conflict of Interest: The study has no conflict of interest to declare by any author.

Source of Funding: None
Ethical Approval: No.621/2022 Dated 24.03.2022

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Original Article

The Impact of Air Pollution on Chronic Sinusitis and Rhinitis: A Prospective Observational Study

Haider Zaman, Syed Muddasir Shah, Mubashar Ullah Jan, Noor Hayat Khan and Majid Ali

ABSTRACT

Objective: To examine the relationship of air pollution on the worsening of chronic sinusitis and rhinitis symptoms among 100 patients.

Study Design: Prospective, observational study

Place and Duration of Study: This study was conducted at the Department of Otolaryngology- Head & Neck Surgery, MTI Mardan Medical Complex, Mardan, KP – Pakistan from January 2022 to March 2023.

Methods: This prospective, observational study was carried out in a tertiary care hospital over a period of one year. Hundred patients with chronic sinusitis and rhinitis were included in the study. Self-administered questionnaires were used to obtain information on the symptoms' severity and exposure to air pollutants, namely PM2. 5, PM10, NO2, and SO2, while air quality data were obtained from local authorities. The relationship between the identified pollutants and the extent of symptoms was analyzed using multivariate regression analysis.

Results: In the patient population, 56 were female and 44 were male with a mean age of 38 years. The overall symptoms' intensity was significantly higher in patients exposed to higher levels of PM2. 5 and PM10. The respondents from regions with greater NO2 and SO2 levels also complained of more intense effects. Multivariate analysis also revealed the predictors of increased symptom severity included PM2. 5, PM10, NO2, and SO2 ($p < 0.05$).

Conclusion: This study clearly shows a positive correlation between air pollution and the extent of chronic sinusitis and rhinitis symptoms. Minimizing the emissions of particulate matter, and gaseous pollutants could help in lessening the symptoms and enhance the quality of life of the patients. Such adverse health impacts underscore the need for public health interventions and better air standards.

Key Words: Sinusitis, rhinitis, pollution, symptoms' intensity

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INTRODUCTION

Sinusitis and rhinitis are long-standing diseases that are widespread and cause significant discomfort to millions of people worldwide. Chronic sinusitis is characterized by inflammation of the sinus cavities that lasts for more than 12 weeks, and rhinitis is inflammation of the nasal mucosa with manifestations including nasal blockage, discharge, sneezing and itching[1]. These conditions reduce the quality of life and work output, and entail enormous healthcare costs[2].

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Poor air quality which is a common environmental problem has thus been deemed to pose a threat to the occurrence of respiratory diseases. The main pollutants of interests are particulate matter, both PM2. 5 and PM10, nitrogen dioxide (NO2), sulfur dioxide (SO2), and ground level ozone (O3)[3]. PM, particularly PM2. 5, can reach the respiratory tract's lower regions and aggravate inflammation in the lungs and other respiratory diseases[4]. Nitrogen dioxide and sulfur dioxide, gaseous pollutants mainly emitted by vehicles and industries, directly affect the respiratory mucosa, which aggravates symptoms of chronic respiratory diseases[5]. Many cross-sectional studies have also shown that air pollution contributes to the worsening of asthma and chronic obstructive pulmonary disease (COPD)[6]. Nevertheless, the effects of air pollution on chronic sinusitis and rhinitis are not well investigated. Knowledge of this relationship is important for designing specific prevention measures and addressing issues related to negative impacts of air pollution on respiratory health. The proposed study will therefore focus on establishing the relationship between air pollution and the intensity of chronic sinusitis and

rhinitis symptoms in 100 patients. It is therefore our belief that patients suffering from AI with higher exposure levels to air pollutants; PM2. 5, PM10, NO2, and SO2 will have higher symptom severity levels. The findings of this study will be useful in understanding the environmental factors that contribute to chronic sinusitis and rhinitis and make recommendations to enhance the quality of air and respiratory health of the population.

METHODS

This prospective, observational study was carried out in a tertiary care hospital over a period of one year. Hundred patients with chronic sinusitis and rhinitis were included in the study. Self-administered questionnaires were used to obtain information on the symptoms' severity and exposure to air pollutants, namely PM2. 5, PM10, NO2, and SO2, while air quality data were obtained from local authorities. The relationship between the identified pollutants and the extent of symptoms was analyzed using multivariate regression analysis.

Data Collection: The severity of the symptoms was measured using a standardized questionnaire, whereas the air quality indices were retrieved from the nearby monitoring stations with the emphasis placed on PM2. 5, PM10, NO2 and SO2. The demographic of the patients and their medical history were also documented.

Statistical Analysis: Statistical analysis of the data collected was done by using the Statistical Package for Social Sciences (SPSS 24. 0). Basic quantitative analysis was conducted for demographic characteristics, while multiple regression analysis was used to determine the significance of air pollutants and their impact on the symptoms' intensity. The level of statistical significance was set at $p < 0.05$.

RESULTS

In the present study, 56 of the hundred patients were female while the rest 44 were male and with a mean age of 38 years. Regarding the place of residence, 72% of the patients were from the urban regions. Patients indicated that the experienced symptoms were of moderate to severe intensity in 65% of cases. A significant positive relationship between PM2. 5 and PM10 and the severity of the symptoms was revealed ($p < 0.05$). The patients in areas with high NO2 and SO2 also complained of more severe symptoms ($p < 0.05$). The findings of multivariate regression analysis signified that PM2. 5, PM10, NO2, and SO2 were all predictors of the symptoms severity but the most important of all was PM2. 5. Therefore, it can be inferred that air pollution plays a role in the aggravation of chronic sinusitis and rhinitis. This paper therefore stresses the need for improved legislation on air quality and health measures that would minimize such effects and the wellbeing of the affected persons.

Table No.1: Demographic Characteristics of the Study Population

Characteristic	Number of Patients (n=100)	Percentage (%)
Gender		
- Female	56	56
- Male	44	44
Age (years)		
- Mean (SD)	38 (12)	
- Range	18-65	
Residence Area		
- Urban	72	72
- Rural	28	28
Symptom Severity		
- Mild	35	35
- Moderate	45	45
- Severe	20	20

Table No.2: Air Pollutant Levels in Study Areas

Pollutant	Urban Areas (Mean ± SD)	Rural Areas (Mean ± SD)	Overall (Mean ± SD)
PM2.5	45.2 ± 10.3 µg/m³	25.4 ± 5.2 µg/m³	35.3 ± 12.4 µg/m³
PM10	78.4 ± 15.6 µg/m³	40.6 ± 10.8 µg/m³	59.5 ± 20.1 µg/m³
NO2	32.1 ± 7.4 ppb	15.2 ± 4.1 ppb	23.6 ± 10.2 ppb
SO2	12.5 ± 3.8 ppb	6.3 ± 2.1 ppb	9.4 ± 4.3 ppb

Table No.3: Multivariate Regression Analysis Results

Variable	Coefficient (β)	Standard Error (SE)	p-value
PM2.5	0.48	0.12	< 0.001
PM10	0.35	0.15	0.015
NO2	0.29	0.13	0.028
SO2	0.22	0.10	0.032

DISCUSSION

The aim of the present study was to determine the impact of air pollution on chronic sinusitis and rhinitis symptoms in 100 patients. The data collected for the purpose of the given research show that increased levels of air pollutants such as PM2. 5, PM10, NO2, and SO2, are directly related to the worsening of these diseases' symptoms. Such results are in line with the previous researches suggesting that air pollution is a severe threat to the respiratory system. As it is already known

that the particulate matter especially PM2. 5 and PM 10 are great threats to the respiratory health of people. PM can get to the alveolar region of lungs and cause inflammation and oxidative stress that worsens the condition of chronic sinusitis and rhinitis. This was supported by the study we conducted and showed that the two tested air pollutants, PM2. 5 and PM10, are significant and positively associated with the symptoms of sinusitis and rhinitis among the patients. Similarly, Gehring et al in a cross-sectional study that involved human beings, established that there was a positive correlation between long-term exposure to PM10 and chronic sinusitis among the adults[7]. Among the air pollutants typical to most urban environments, nitrogen dioxide (NO2) and sulfur dioxide (SO2) have also been confirmed to aggravate respiratory illnesses. NO2 is mainly generated from automobiles and industries while SO2 is mainly generated from burning of fossil fuels. These pollutants can stimulate inflammation and increased sensitivity of the respiratory mucosa and, therefore, deterioration of chronic sinusitis and rhinitis. Higher concentration of NO2 and SO2 was also found to be associated with worsening of symptoms which is in consonance with Lindgren et al who concluded that traffic related air pollution including NO2 worsens the risk of chronic rhino sinusitis[8-9]. In addition, Jacquemin et al. conducted a systematic review of studies on air pollution and risk of and severity of rhinitis and concluded that all the studies were in agreement that exposure to air pollution increased the risk and severity of rhinitis[10]. This review also pointed out that particulate and gaseous pollutants were capable of initiating and aggravating rhinitis symptoms. This study contributes to the existing literature by offering concrete information about the link between these pollutants and the severity of chronic rhinitis in a clinical practice. Air pollution also poses the following impacts on respiratory diseases; sinusitis, rhinitis, and other health complications. Research conducted has indicated that AIPs have the effect of worsening asthma and chronic obstructive pulmonary disease (COPD). For example, Orellano et al conducted a study and found out that both short term and long term exposure to air pollution enhances the risk of the occurrence of asthma exacerbations[11-13]. Likewise, the present results suggest that chronic exposure to high levels of PM2. 5, PM10, NO2 and SO2 can worsen the symptoms of chronic sinusitis and rhinitis implying that air pollutants cause respiratory inflammation and hypersensitivity. Several strengths of the present study can be mentioned: The prospective design of the study, the assessment of symptoms through standardized questionnaires, and the use of local air quality measurements. Of course, there are also limitations to be taken into account. The research was a single center trial and therefore the results might not be applicable to other settings. Also, major air pollutants were considered in the study, but other environmental and lifestyle factors such as indoor air quality, smoking and occupational exposure were not considered which may act as potential sources of bias.[14-16].

CONCLUSION

The relationship between air pollution and the intensity of chronic sinusitis and rhinitis has been established. They support the call for more health promotion campaigns aimed at lowering the levels of air pollution and preventing the health impacts from affecting vulnerable groups. Further work should be conducted based on a larger number of participants and with more centers, and more extensive data should be collected on various environmental and lifestyle factors to better explain the association between air pollution and chronic respiratory diseases.

Author's Contribution:

Concept & Design of Study:	Haider Zaman
Drafting:	Noor Hayat Khan
Data Analysis:	Syed Muddasir Shah, Mubashar Ullah Jan
Revisiting Critically:	Noor Hayat Khan
Final Approval of version:	By all above authors

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Original Article

To Determine Predictive Factors For Difficult Laproscopic Cholecystectomy Using Ultrasonography Criteria

Muhammad Kashif, Zia Ullah, Muhammad Ali, Muhammad Ibrahim Shuja, Faiz ur Rahman and Aamir Ali Khan

ABSTRACT

Objective: The aim of the study was to find out the predictive factors for difficult laproscopic cholecystectomy using ultrasonographic criteria.

Study Design: cross-sectional study

Place and Duration of Study: This study was conducted at the department of Bacha Khan Medical Complex/Gajju Khan Medical College-SWABI from July 2022 to December 2022.

Methods: After taking permission from the ethical committee of the institute. A total of 154 individuals were enrolled in this study. Individuals of both genders diagnosed with cholelithiasis and were admitted for laparoscopic cholecystectomy were included. Gallbladder wall thickness, impacted stone, number of gallstones, pericholecystic fluid, , and constricted gall bladder were the main features examined by ultrasonography . All the data were analyzed using SPSS version 24. A P value was regarded as statistically significant if it was less than 0.05. Ultrasonography's diagnostic effectiveness indices, including sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy, were tested.

Results: Out of 154 individuals, 31 (20.1%) were male and 123 (79.87%) were female. The presence of pericholecystic fluid on ultrasonography, gall bladder wall thickness greater than 4 mm and stone size were the main the predictors of a difficult laparoscopic cholecystectomy. The difficult laparoscopic cholecystectomy was predicted by sensitivity, specificity, positive predictive value, negative predictive value, and probing precision of gall bladder wall thickness greater than 4 mm and pericholecystic fluid on ultrasonography. The number of gall stones on ultrasonography demonstrated 96.5%, sensitivity, 75% specificity, 99.3%, and PPV 37.5%, NPV and 96% diagnostic accuracy.

Conclusion: Our study concluded that Ultrasonography should be used as a screening method because it is a very good indicator in difficult laparoscopic cholecystectomy in the majority of the participants. This can assist the surgeon in anticipating any possible issues that may arise during surgery.

Key Words: Predictive factors, Difficult laproscopic cholecystectomy; Ultrasonographic criteria

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INTRODUCTION

The surgical removal of the gallbladder because of inflammation or stone formation is known as a cholecystectomy. And it's the most common surgery carried out in the biliary system.[1] The recommended and acknowledged gold standard for the definitive treatment of gallstones or cholelithiasis symptoms is laparoscopic cholecystectomy.[2] Compared to a typical open cholecystectomy, this surgical approach offers several benefits, including less trauma, less pain, a shorter hospital stay, improved cosmetic results, and a quicker recovery.[3-4] Yet some research indicates that compared to open cholecystectomy, laparoscopic cholecystectomy offers a greater rate of complications. These complications include damage to the vascular and visceral structures during the application of a trocar and Verses needle, gallbladder perforation, bile leakage, injury to the common bile duct, and other issues like external biliary fistula, perihepatic collection, wound sepsis, haematoma, foreign body inclusions, adhesions, metastatic port-site deposits, and cholelithoptysis.[1-3] The conversion rate to an open surgery during the early years of laparoscopic cholecystectomy was between 2 and 15%. The conversion rate decreased to around 1% to 6% after years of learning and comprehending the laparoscopic procedure and growing surgeon expertise. This change

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was an effort to prevent problems because of a number of issues that arose throughout the process.[5] Preoperative and intraoperative risk factors that increase the complexity of laparoscopic cholecystectomy include advanced age, male gender, body mass index (BMI), history of abdominal surgery, acute cholecystitis with fever, leukocytosis, gallbladder stones, and particular ultrasonographic findings like gallbladder distention and wall thickness ≥4 mm, impacted gallstones, as well as pericholecystic fluid collection. According to a study by Kama et al., the risk of open cholecystectomy was significantly correlated with six parameters: prior diagnosis of acute cholecystitis, sonographically detected thickened gallbladder wall, upper abdominal tenderness at the time of surgery, male gender, age, and history of abdominal surgery.[6] The preferred method of investigation for gallbladder or biliary diseases is ultrasonography. The most often used technique is preoperative abdominal ultrasonography since it is an inexpensive, radiation-free, & non-invasive diagnostic method.[7] Therefor the current study was carried out to determine predictive factors for difficult laproscopic cholecystectomy using ultrasonographic criteria.

METHODS

The current cross-sectional study was conducted in the surgery department of Bacha Khan Medical Complex/Gajju Khan Medical College-SWABI from July 2022 to December 2022 after taking permission from the ethical committee of the institute. A total of 154 individuals were enrolled in this study. WHO sample size calculator was used for sampling procedure. Individuals of both sexes diagnosed with cholelithiasis and were hospitalized for laparoscopic cholecystectomy were included. Non-probable consecutive sampling technique were used .Individuals with abnormal liver function tests (LFTs), or jaundice , acute cholecystitis, abnormal coagulation, or CBD stones as well as any other CBD disease profile, and those who had previously had surgeries in the upper abdominal region were not were excluded. Patients from the general surgery department's outpatient department (OPD) who met the inclusion criteria were admitted to the ward for a laparoscopic cholecystectomy. A comprehensive examination and a detailed history were obtained from the participants. The identical probe (Aplio 500, Toshiba, Japan) was used by the radiologist to perform preoperative ultrasonography on each individuals. The features examined by ultrasonography were wall thickness of gallbladder, gallstones frequency, pericholecystic fluid, impacted stone, and contraction in gall bladder. This study does not employ learning curve statistics because the surgeon has laparoscopic surgical expertise. The results of the procedure were documented on a specially created proforma. The following standards were established in order to objectively classify the surgical results as challenging laparoscopic cholecystectomy.

i. Technique duration of more than sixty minutes (the amount of time from the start of the trocar or Verses needle to the gallbladder's removal)
ii. During dissection, the gallbladder tore, causing bile and stone to leak.
iii. The gall bladder was dissected from the bed for more than 30 minutes.
iv. Calot's triangle took more than thirty minutes during dissection.
v. Any process that requires being converted to the open

Data analysis: The data were analyzed using 24 version of SPSS and frequencies and percentages were calculated for the categorical variables, such as gender, the number of gallstones, the thickness of the bladder wall, and the presence of pericholecystic fluid. Continuous numerical data, such as age, were used to compute the mean and standard deviations. The chi-squared post-stratification test was used. A P value was regarded as statistically significant if it was less than 0.05. Ultrasonography's diagnostic effectiveness indices, including sensitivity, specificity, positive predictive value (PPV), negative predictive value (NPV), and accuracy, were tested and computed using the standard formulae shown below:

TP/TP+FN x 100 is the sensitivity. Sensitivity = TN/TN+FP x 100 Value of Positive Prediction = TP/TP+FP × 100 Negative prediction value = TN/TN+FN x 100.

RESULTS

Overall 154 participants, who had laparoscopic cholecystectomy were included in this study.

Table No. 1. Parameters and demographic features of the study participants N=150

Features	Statistics/N(%)
Age in years	
Range (median)	44(21-66)
Mean ± SD	42.4±9.8
Genders	
Female	123 (79.87%)
Male	31 (20.1%)
Body mass index (kg/m2)	
Less than 25	104 (67.5)
25 to 27.5	15 (9.74)
Greater than 27.5	35 (23.7)
Gallbladder palpable	
No	118(76.62)
Yes	36(23.37)
Duration of surgery in minutes	
Mean	20.36 ± 17.63
Range	8.30 – 90.6
Rate of conversion	08(5.1)

Table No. 2: Findings of Preoperative Ultrasonography of the study participants (n=154)

Ultrasonography results	N /%
Peri-cholecystic fluid	9(5.8)
No of stones	
One	10(6.4)
More than one	144(93.5)
Thickness of the wall of gall bladder	
Less than 4 millimeter	134(87)
Equal or greater than 4 millimeter	20(12.9)
Stone that were impacted	22(14.28)
Gallbladder impacted	20(12.9)
Stone size	
Less than one centimeter	124(80.5)
Equal are greater than 1 centimeter	30(19.4)

The mean age of the study participants were (range 21-66 years) 42.4±9.8 years. Out of which 31 (20.1%) were male and 123 (79.87%) were female. The mean duration of the surgical procedure was 21.35 ± 17.63 minutes, and the average duration of the hospital stay after surgery was 1.5 ± 0.6 days. The participants demographic features presented in table 1 while table 2 represent the Ultrasonography results. The presence of pericholecystic fluid on ultrasonography, gall bladder wall thickness greater than 4 mm and stone size were the main the predictors of a difficult laparoscopic cholecystectomy as described in table 3. Sensitivity, specificity, positive predictive accuracy, negative predictive value, as well as evaluation accuracy of gall bladder wall thickness exceeding 4 mm or pericholecystic fluid on ultrasonography were used to predict the difficult laparoscopic cholecystectomy. The results revealed 90.4%, 98.4%, 95.5%, 99.0%, and 98%, and 75%, 99.3%, 85.7%, 98.6%, and 98%, correspondingly. The number of gallstones on ultrasonography revealed 96% diagnostic accuracy, 96.5% sensitivity, 75% specificity, 99.3% PPV, and 37.5% NPV.(Table 4)

Table No. 3: Relationship between Difficult Laparoscopic Cholecystectomy and preoperative Ultrasonography Outcomes (n=154)

Ultrasonography features	Results	Laparoscopic Cholecystectomy			
Wall thickness of gallbladder	----------	Difficult (n) ----------	Not difficult (n) ----------	Total (n) ----------	Value of P
	≤ 4mm	19(12.3)	98(63.6)	117	
	> 4mm	32(20.7)	05(3.2)	37	
Stone size	<1cm	31(20.1)	93(60.3)	124	.001*
	≥1cm	21(13.6)	9(5.8)	30	
Mobility of gall stone	Mobile	100(64.9)	32(20.7)	132	.004*
	Impacted	21(13.6)	1(0.6)	22	
Contracted gall bladder	No	3(1.9)	131(85.0)	134	.001*
	Yes	18(11.6)	02(1.2)	20	
Pericholecystic fluid	No	26(16.8)	99(64.2)	125	.001*
	Yes	27(17.5)	2(1.2)	29	
A p-value of less than 0.05 is taken to be statistically significant.					

Table No. 4: The diagnostic accuracy of ultrasound results in predicting difficult laparoscopic cholecystectomy

Ultrasound results	Diagnostic accuracy				
	Sensitiviy (%)	Specificity (%)	Positive Predictive Value (%)	Negative Predictive Value (%)	Accuracy (%)
Wall thickness of gallbladder	90.4	98.4	95.5	99.0	97.9
Size of the stone (≥1cm)	96.5	75	99.3	37.5	96
Gall stone mobility (Impacted	40	100	100	76.9	80
Contracted gall bladder	65	97.5	92.9	84.5	86.7
pericholecystic fluid	75	99.3	89.7	98.6	98

DISCUSSION

One of the most common problems with digestion is cholelithiasis. The incidence of gallstones varies almost globally. And they are usually asymptomatic (>80% of the time).[8] The gold standard for treating symptomatic gallstones is laparoscopic cholecystectomy because of its benefit of decreased postoperative morbidity, safety, and success.[9] It is currently the procedure that general surgeons do the most frequently. Approximately 80% of cholecystectomies performed now are laparoscopic procedures.[10] The aim of the study was to determine the

predictive factors for difficult laproscopic cholecystectomy using ultrasonographic criteria. The surgeons had trouble performing a laparoscopic cholecystectomy when the gallbladder was fibrotic and contracted, had thick adhesions near Calot's triangle, or was highly inflamed or gangrenous. Male sex, elderly status, being overweight, acute cholecystitis attacks, prior surgery to the abdomen, and certain ultrasonographic abnormalities such as thickening gall bladder wall, enlarged gall bladder, pericholecystic fluid storage, and impacted stone are danger variables which make laparoscopic surgery difficult. Laparoscopic cholecystectomy is usually safe and uncomplicated, however it can occasionally be difficult. Most of the untrained laparoscopic surgeons make use of quite simple equipment and facilities. Additionally, senior laparoscopic surgeons might not be accessible to them. The choice c for laparoscopic cholecystectomy have been more relaxed as competence has grown. According to several studies, advanced age is a significant risk factor for a complex laparoscopic cholecystectomy.[11] and set the cutoff age for this purpose at 50 years old. Age had no effect on intraoperative complications in this research because the majority of the patients were under 50. Gupta et al.[12] found a similar result, however Saleem AA et al.[13] found a significant correlation between surgical difficulties and age greater than 50. In this study, female participants were in the majority (79.87%). Due to the effect of estrogen and progesterone women are more likely to develop gallstones on biliary cholesterol levels and gallbladder motility.[14]

It is debatable if male sex and difficult cholecystectomy are related. Male gender may increase the likelihood of a troubling cholecystectomy, according a number of studies. Due to the belief that cholelithiasis mostly affects females, men may be diagnosed later. There may be significant adhesions as a result of the many inflammatory episodes prior to diagnosis. As to Nidoni et al., the conversion rate of males was significantly greater than that of females ($p = 0.034$, 95% CI).[15] Worldwide, the percentage of patients who switch from laparoscopic to open cholecystectomy ranges from 7% to 35%.[16] The overall conversion rate in the present research was 5.1% and was not influenced by age or gender, although all individuals shared predictive characteristics such as palpable GB, pericholecystic storage, thickening GB walls, and a BMI over 25.. This result differs from that of Bourgouin et al. (4.3%).[17]The operating surgeon's skill may be the reason for this low conversion rate. A number of prediction models for the difficult LC have been proposed however, these are predicated on the surgeon's subjective evaluation of the difficulties he experiences during surgery. These assessments are challenging to transfer between institutions, though, because they are predicated on a surgeon's skill and standard procedure.[18]Thus, ultrasonography results have been utilized to predict the outcome of difficult laparoscopic cholecystectomy procedures. Studies have shown that gallbladder is a predictor of complicated surgery.[19]Increased gall bladder wall thickness makes it harder for the gall bladder to separate from its bed; thicker walls also make it harder to grasp and manipulate the gall bladder and make dissection at Calot's triangle and the gall bladder bed harder to accomplish.[13] Similar to previous research, we found a substantial (p 0.001) correlation between the complexity of the operation and the thickness of the gall bladder wall. According to the research, the existence of pericholecystic fluid on the use of ultrasound was a predictor of a difficult laparoscopic cholecystectomy; it was observed in 29 people, and in 27 of those cases, the surgical procedure was determined to be difficult.. In their searches, Nidoni et al.[15] and Chindarkar H et al. [20]reported similar findings. A stone impacted at the neck is another significant signal with a high predictive value. A stone impacted at the neck is another significant signal with a high predictive value.

An impacted stone near the gall bladder's neck poses some technical difficulties during the laparoscopic cholecystectomy because of the gall bladder's distension and thick wall. We discovered that 22 patients (14.28%) had impacted stones, and all of them had challenging surgical outcomes. Mucocele from the impacted stone made it difficult to grab the gallbladder's muscles for retraction during dissection, making the procedure puzzling. This outcome is in line with previous research.[21] Numerous investigations have found a statistical correlation between the size of the stones and the decision to switch from laparoscopic to open cholecystectomy.[20] The current study finds the same thing, however another study demonstrated that stones bigger than 20 mm were linked to a greater conversion rate.

Limitation: Ultrasound's main drawbacks are operator dependence, sinologist experience, challenges with obese patients, and issues with a contracted gallbladder.

CONCLUSION

Our study concluded that Ultrasonography should be used as a screening method because it is a very good indicator in difficult laparoscopic cholecystectomy in the majority of the participants. This can assist the surgeon in anticipating any possible issues that may arise during surgery. A difficult laparoscopic cholecystectomy was substantially ($p < 0.001$) linked with preoperative ultrasonography results.

Author's Contribution:

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Drafting:	Zia Ullah, Muhammad Ali
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Original Article

Zygomatic Complex Fractures in Patients with Oral and Maxillofacial Trauma; Prevalence and Causes at a Tertiary Care Center

Zaineb Abbas[1], Muhammad Bin Imran[3], Faria Khalil[3] and Muhammad Azeem Khan[2]

ABSTRACT

Objective: To find out the prevalence and causes of zygomatic complex fractures in patients with oral and maxillofacial trauma at a tertiary care center.

Study Design: Cross sectional study.

Place and Duration of Study: This study was conducted at the Oral Biology / Oral Medicine, Bakhtawar Amin Medical and Dental College, Multan from March 2023 to May 2024.

Methods: A total of 120 patients from the outpatient department who presented with oral and maxillofacial injuries and were of either gender were included in this research and on contrary the individuals who presented with injuries from bomb blasts or gunshot wounds were excluded from the study. All the data was analyzed by using SPSS Version 22.

Results: A total of 120 individuals who presented with maxillofacial trauma were studied. The patients' average age was 31.522 years. The age group of 20 to 30 years old comprised the majority of patients in our research, making approximately 62% of all patients. There were 12.5% of patients in the age category of 31 to 40 years old and 25% of patients in the age group of 41 to 50 years old. Gender distribution showed that there was a preponderance of male patients, making up 75% of the total count while female patients made up 25% of it. 40 cases (33.3%) of zygomatic complex fractures were reported. The most prevalent etiology of zygomatic complex fractures was road traffic accidents 18 (45%) cases, followed by falls from heights, 13 (32.5%) cases. Since the majority of patients with zygomatic traumas were in the demographic range of 20 to 30, we found that this was the most susceptible age group for zygomatic complex fractures ($p < 0.05$). The gender-wise correlation with zygomatic fractures showed that, in comparison to female gender, male gender was more affected ($p < 0.05$).

Conclusion: Our research leads us to the conclusion that traffic accidents are the most frequent etiological cause for zygomaticomaxillary complex fractures.

Key Words: Road Traffic Accidents, Zygomatic bone, Fractures, Maxilla, Mid-facial complex

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INTRODUCTION

Maxillofacial trauma is among the most widely recognized cause of bony fractures of the facial skeleton for both the medical professionals and hospital based procedures, but they are frequently overlooked in the course of the first assessment[(1)].

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With an array of etiologies and treatment modalities in both developed and developing countries, the zygomatic bone is a vital component of the face for both functional and aesthetic reasons[(2)]. The cause of injuries to the maxilla receives very little attention in the discipline of trauma in general, despite a fact that injuries to the head, neck, and face are still relatively common[(3)]. The initial cause is influenced by the economic, social and environmental factors[(4)]. The most common of facial fractures are nasal apparatus fractures followed by fractures of zygomaticomaxillary complex, which come in second. At one end, the integrity of zygomaticomaxillary complex is essential for eye protection, on the other hand it also plays a role in the formation of the orbital cavity, maxillary sinus, temporal fossa and zygomatic arch[(5)]. There exists variability in the frequency and reasoning for maxillofacial fractures both globally and also within one nation due to social, cultural and environmental factors unique to that particular socioeconomic group[(7,6)]. In earlier studies, it was found that the traffic

accidents were the main etiological cause for maxillofacial injuries[8]. Pain, sensory deficit, ecchymosis, a flattened malar arch, periorbital wounds, displacement of the palpebral fissure, corneal bleeding, diplopia and exophthalmos are just a few of the indicators and symptoms associated with zygomatic complex fractures[9]. Radiological examination methods such as occipito-mental view, sub-mentovertex view and computerized CT scan with reconstruction are capable of identifying such fractures. Different methods of treatment for zygomatic maxillary complex fractures have been created, depending on the degree of the dislocation of the zygomatic bone. They entail open reduction, different levels of exposure, fixation, and typical conservative treatments[10-12]. The zygomatic bone is one of the pivotal components of the viscera cranium which defines the face form and shape. In order to fully understand the functional and cosmetic implications of zygomatic complex injuries, appropriate examination and treatments are necessary[9].

This study aimed to identify the most frequent causes of zygomatico-maxillary complex fractures which will help the medical and dental practitioners to adopt appropriate measures which will in turn substantially decrease the risks associated with such fractures.

METHODS

The current study was conducted from March 2023 to May 2024. A total of 120 patients from the outpatient department who presented with oral and maxillofacial injuries and were of either gender were included in this study. Individuals who presented with injuries from bomb blasts or gunshot wounds were excluded from the research. For the research, non-probability sequential sampling was used to incorporate patients. A thorough oral clinical examination and radiographic evaluation were performed on each patient. On a pre-made proforma, all the information was entered, including the age, gender and side of the fracture as well as the etiological variables. With a 6% margin of error, a 95% confidence interval, and a 12.3% historical frequency of interpersonal violence, the open epi web-based sample size calculator was used to determine the sample size, which came out to be 120. IBM SPSS Version 22 was used for data analysis. The age-related mean and standard deviations were figured. For categorical variables, percentages and frequencies were used. The Chi-Square test was used to evaluate the relationship between categorical variables, with $p < 0.05$ being considered statistically significant.

RESULTS

A total of 120 patients who presented with maxillofacial trauma were studied. The patients' average age was 31.522 years. The age group of 20 to 30 years comprised the majority of the patients in our research, making approximately 62% of all patients. There were 12.5% of patients in the age category of 31 to 40 years and 25% of patients in the age group of 41 to 50 years old. Gender distribution showed that there was a preponderance of male patients, making up to 75% of the total patients while female patients made up to 25% of this count. 40 cases (33.3%) of zygomatic complex fractures were reported. The most prevalent etiology of zygomatic complex fractures was road traffic accidents, accounting for 18 (45%) cases, followed by falls from heights, accounting for 13 (32.5%) cases. Table 1 shows the remainder of the etiological patterns. In terms of the side of the fracture, 60% of patients had the right side involved, 30% had the left side involved, and 10% had both sides fractured. Since the majority of patients with zygomatic traumas were in the demographic range of 20 to 30, we found that this was the most susceptible age group for zygomatic complex fractures ($p < 0.05$) (Table 2). The gender-wise correlation with zygomatic fracture showed that, in comparison to female gender, male gender was more affected ($p < 0.05$) (Graph 1)

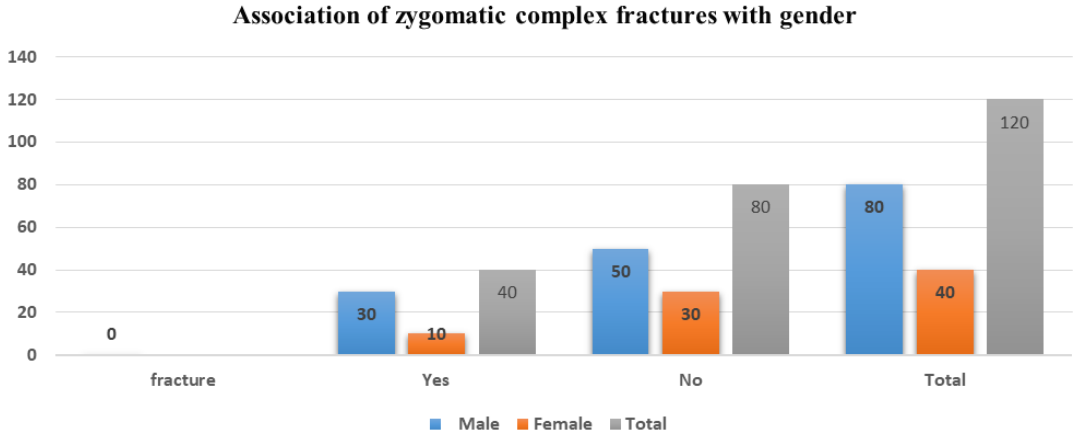

Figure No. 1: Gender-wise correlation with zygomatic fractures

Table No. 1: Etiology of zygomatic complex fractures

	Etiology					
Zygomatic complex fractures	**Road traffic accidents**	**Fall from height**	**Emotional violence**	**Game injury**	**Additional**	**Total**
Yes	18 (45%)	13 (32.5%)	4 (10%)	4 (10%)	1 (2.5%)	40 (33.3%)
No	35 (43.5%)	30 (37.5%)	7 (8.75%)	7 (8.75%)	1 (1.25%)	80 (66.7%)
Total	53	43	11	11	2	120

Table No. 2: Association of zygomatic complex fractures with age

Age distribution					p-value
Zygomatic complex fracture	20-30 years	31-40 years	41-50 years	Total	0.01
Yes	25 (62%)	5 (12.5%)	10 (25%)	40	
No	40 (50%)	30 (37.5%)	10 (12.5%)	80	
Total	65	35	20	120	

DISCUSSION

The zygomaticomaxillary complex, which plays a significant role in both the function and appearance, is a vital section of the face and is particularly vulnerable to injury in the event of a trauma. As the face's vertical and horizontal support system, the zygomaticomaxillary complex is a significant and intricate facial structure. The zygoma is a strong buttress of the central part of the facial skeleton and a crucial component of the orbital floor as well as its lateral and inferior rims. Due to their central placement in the face, fractures to the maxilla, naso-ethmoidal region, and orbital area are prevalent. There are four distinct stages of the fracture complex that might result in various types of facial abnormalities. Functional problems such as paresthesia, trismus, diplopia and anti-mongoloid tilt may cause great distress to patients and often needs surgical intervention.

Out of the 120 patients who presented with maxillofacial injuries in our research, 40 (33.3%) had zygomaticomaxillary complex fractures overall. Moreover, we found that the zygomaticomaxillary complex fractures affected men more often than they affected women. This might be explained simply by the fact that men in comparison to women are more likely to experience a variety of professional and social risks in our culture, such as falls from heights, traffic accidents, assaults by others, sports injuries etc. Numerous investigations have revealed similar results, supporting the idea of male dominance in zygomaticomaxillary complex fractures. According to a research[13] that was carried out in India, 98 individuals with zygomaticomaxillary complex fractures who were treated; of these patients, men made up 72.4% (n =71) and females made up 27.6% (n=27) of the total count. In terms of age groupings, we've discovered that those between the ages of 20 to 30 years were the most susceptible group to suffer from zygomaticomaxillary complex fractures since they engage in a lot of outdoor activities. Comparatively speaking to our results, a Pakistani research[14] similarly found that patients, particularly men in their twenties, had an increased incidence of zygomaticomaxillary complex fractures. The most frequent cause of zygomaticomaxillary complex fractures in our research was traffic accidents, which represented (45%) of all the etiologies. Falling from height was the second most prevalent cause, accounting for (32.5%) of all fractures. The percentages of sports injuries and interpersonal assault were both 10% each. Our results are in confluence with some other researches as well. According to a research done in India in 2013, zygomaticomaxillary complex fractures were mostly caused by Road Traffic Accidents (RTA) too. Similar to our results, they found that the prevalence of RTA in their sample was 57.1%, with fall from height coming in second at 16.3% and interpersonal violence at 12.3%. In their research, Rahman A et al[14] also found that RTA accounted for 75% of all etiologies of zygomaticomaxillary complex fractures. Others included accidental falls (9%), sports injuries (4%), and interpersonal assaults (12%). The growing frequency of zygomaticomaxillary complex fractures in Pakistan is caused by the drivers who are young and are ignorant of traffic laws, breaking them and driving carelessly. Since the majority of individuals in Pakistan come from low-income families, they often utilize public transit to go about and are thus more likely to fall victim to this particular trauma.

CONCLUSION

Our research leads us to the conclusion that traffic accidents are the most frequent etiological cause for zygomaticomaxillary complex fractures. The most vulnerable age group in this regard was found to be ranging between the ages of 20 and 30 years. It is further imperative that roadway regulations be strictly

enforced and that the general public be made aware of them aptly.

Author's Contribution:

Concept & Design of Study:	Zaineb Abbas
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Revisiting Critically:	Zaineb Abbas, Muhammad Bin Imran
Final Approval of version:	By all above authors

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Original Article

Outcomes and Demographic Profiles of Patients Undergoing Primary Percutaneous Coronary Intervention at Lady Reading Hospital Peshawar

Demographic Profiles of Patients With PPCI

Zia Ullah, Saddam Hussain, Dawood Ahmed Jan, Jabar Ali and Adil Rehman

ABSTRACT

Objective: This study aims to analyze the demographic and clinical predictors of post-PCI outcomes in CAD patients, focusing on the role of BMI, diabetes, age, and procedural variables such as door-to-balloon time (DTBT) and total ischemic time (TIT).

Study Design: A retrospective cohort study.

Place and Duration of Study: This study was conducted at the Lady Reading Hospital Cardiology Department from August 2023 to May 2024.

Methods: In this retrospective cohort study, 90 CAD patients undergoing PCI were assessed for demographic and clinical parameters, including age, BMI, diabetes status, and Killip class. Chi-square tests were applied to determine associations between demographic factors and clinical outcomes, with a focus on post-PCI complications such as stent thrombosis, left ventricular failure (LVF), and renal failure.

Results: The mean age of patients was 57.03 years, with a mean BMI of 27.1. High variability in blood sugar and prolonged TIT correlated with worse outcomes. Stent thrombosis, LVF, and renal failure were significantly associated with patient demographics, especially BMI and comorbidity status ($p < 0.05$). Significant chi-square values were observed for associations between comorbidities, stent thrombosis ($p = 0.008$), and cardiogenic shock ($p = 0.004$).

Conclusion: This study underscores the importance of demographic and clinical factors in predicting PCI outcomes, with comorbidities and procedural time playing critical roles. Optimizing management protocols for high-risk patients and reducing ischemic time could improve CAD patient outcomes.

Key Words: Coronary artery disease, PCI, BMI, comorbidities, ischemic time, post-PCI outcomes

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INTRODUCTION

CAD still holds a dominant position among cardiovascular illnesses as a cause of morbidity and mortality[1]; clinical outcomes of CAD patients are often compromised with several generic and cardiovascular risk factors which include the increased age, obesity, and uncontrolled diabetes[2]. Recent studies confirm that demographic and baseline clinical characteristics influence outcomes of primary percutaneous coronary intervention, a critical therapy for acute coronary syndrome. Another especially significant risk factor in CAD is BMI, because increased BMI is associated with increased cardiovascular events due to mechanisms influenced by inflammation and insulin resistance[3]. This inflammation also plays a critical role on post-PCI concerns; therefore, a iterative assessment of the BMI related complications is essential among these patients. Although CAD patients of relatively younger age exhibit less severe disease and better prognosis, patients of advanced age with greater PCC burden are at greater risk of adverse outcomes[4]. While the connection between BMI and CAD is known, investigations into the effects on PCI outcomes, stent thrombosis included, remain scant. Also, anti-glycemic therapy is of critical importance for risk stratification of CAD patients, especially those with diabetes, who are candidates for PCI[5]. Hyperglycemia has been associated with higher complications' incidence, including stent thrombosis and left ventricular dysfunction[6]. Result of the

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inflammatory and thrombotic states caused by high blood glucose concentrations[7-8]. Previous investigations have postulated that severe glycemic control pre- and postprocedural could ameliorate target CAD results; however, the appropriate glycemic levels might be difficult for management in acute coronary syndrome, especially for high-risk populations[9,10,11]. In addition, several procedural times including the Door-to-Balloon Time (DTBT) and Total Ischemic Time (TIT) are also valuable to PCI. Evidence presented here and elsewhere supports the time Minneapolis Trail rule to extend that it helps to avoid periods of myocardial ischemia that could lead to irreversible changes[12-13]. Thus, long terms of TIT have been related with the higher rates of morbidity and mortality; however, based on the standard definition and timely intervention plans, CAD patients undergoing PCI require effective interventional strategies for better results. This study examines the interaction between demographic and procedural factors on PCI, with a specific emphasis on patient complication factors and opportunities for improved management.

METHODS

This retrospective cohort study was conducted in Cardiology Department of Lady Reading Hospital from August 2023 to May 2024, 90 adult CAD patients undergoing PCI were enrolled in this study. The categorical inclusion criteria were applied to patients aged 20–80 years with CAD, and to exclude patients if there were missing core laboratory and angiography data at baseline and at the time of revascularisation. The latter included cases with incomplete records, non-Ischemic CAD, acute infections, or severe inflammatory disease. Collection of data included demographic features such as age, sex and BMI and clinical features such as initial blood sugar level, blood pressure, and SpO at presentation and procedural variables including door-to-balloon time and total ischemic time and details of the stent placed. New events developing after the PCI including stent thrombosis, left ventricular failure, cardiogenic shock and renal failure were noted. Patient demographics and clinical characteristics were described by frequency and proportion, and the relationship between demographic variables and clinical event status such as post-PCI complications was evaluated by Chi-square test. Statistical significance was determined at $p<0.05$. Descriptive analysis and variance were performed by SPSS version 25 to test variables for predictors to risk stratification and proper intervention.

Inclusion Criteria

- Adult patients (aged 20-80 years) diagnosed with CAD
- Patients who underwent PCI within the study period
- Complete data on baseline demographics, clinical parameters, and PCI outcomes

Exclusion Criteria

- Patients with incomplete medical records or missing key clinical data
- Non-CAD patients or those undergoing PCI for non-coronary reasons
- Patients with concurrent infections or severe inflammatory conditions

Data Collection: Patient demographics, including age, sex, height, weight, and BMI, were recorded. Clinical variables included baseline blood sugar, blood pressure, and oxygen saturation (SpO2). Procedural parameters, such as DTBT, TIT, stent length, and average stent diameter, were also collected. Post-PCI complications, including stent thrombosis, LVF, cardiogenic shock, and renal failure, were noted.

Statistical Analysis: Descriptive statistics were used to summarize patient demographics and clinical parameters. Means, medians, modes, and standard deviations were calculated for continuous variables. Chi-square tests were employed to assess associations between categorical demographic factors (e.g., BMI and comorbidity status) and clinical outcomes (e.g., post-PCI complications). A p-value of <0.05 was considered statistically significant. Data analysis was conducted using SPSS version 25.This methodological approach allows for a comprehensive evaluation of the associations between demographic and clinical variables with PCI outcomes, providing valuable insights into risk stratification and intervention planning for CAD patients.

RESULTS

In Table 1, the descriptive statistics for patient demographics and clinical parameters highlight a diverse age range among participants (mean age 57.03 years, SD 13.484), with a notable variation in weight (mean 75.57 kg, range 49 kg) and BMI (mean 27.111, range 17.8). The pulse and SpO2 readings (mean pulse 85.43 bpm, SpO2 mean 95.64%) suggest a relatively stable cardiovascular baseline in the cohort. High variance is observed in parameters such as DTBT (mean 91.6 minutes, range 360) and PHSD (mean 265.86 days, range 2875), pointing to wide-ranging delays in time-related variables that could impact clinical outcomes. Syntax scores (mean Syntax-I 19.462, Syntax-II 30.476) and stent characteristics reveal considerable heterogeneity, potentially affecting procedural complexity and patient recovery. Table 2 and Table 3 explore the influence of demographics on clinical outcomes and associations between specific conditions and outcomes. For example, younger patients (20–40 years) with lower BMI classifications appear to experience milder Killip classes and better ejection fractions, while those with obesity have a higher incidence of severe heart failure classifications.

Pearson Chi-Square analysis in Table 3 demonstrates significant associations between demographic factors and adverse outcomes, with variables such as stent thrombosis, acute LVF in-hospital, cardiogenic shock in-hospital, and renal failure showing statistically significant relationships ($p < 0.05$). Notably, conditions like CVA ($p = 0.000$) and 30-day angina recurrence ($p = 0.028$) underscore potential areas for clinical intervention and highlight the influence of baseline demographics on both immediate and short-term outcomes.

Table No. 1: Descriptive Statistics for Patient Demographics and Clinical Parameters

Parameter	N (Valid)	Mean	Median	Mode	Std. Deviation	Range
Age	90	57.03	56.50	50	13.484	61
Height (HT)	90	167.00	167.00	166	6.472	30
BMI	90	27.111	26.587	23.4	3.7971	17.8
Pulse	90	85.43	80.00	80	17.581	84
SpO2	90	95.64	96.00	98	2.585	11
Blood Sugar	90	176.24	149.00	110a	71.340	293
PHSD	90	265.86	170.00	120	358.463	2875
DTBT	90	91.60	60.00	60	72.652	360
TIT	90	357.46	282.50	140	360.320	2880
Syntax-I	90	19.462	21.000	21.5	7.2806	42.5
Syntax-II	90	30.476	30.000	28.2	9.5106	46.8
Length of Stent	90	30.90	32.00	38	14.936	76
Average Diameter of Stent	90	2.7831	3.0000	3.00	0.86909	4.00
Fluoroscopy Time	90	11.679	10.000	6.0	6.7201	37.0
Contrast Volume	90	129.00	125.00	180	42.302	150

Table No. 2: Influence of Demographic Factors on Clinical Presentation and Outcomes

Age	Sex	Height	Weight	Bmi coded	Killip class	Ef	Rwma	Covid vac	Flu vaccine	Htn	Dm	Hyper-l
20 TO 40	male	less than 170 cm	<70 kg	normal	normal	<30% EF	yes	yes	yes	yes	yes	yes
20 TO 40	female	greater than 170 cm	70-100 kg	overweight	mild to moderate LV failure	30 to 40% EF	no	no	no	no	no	no
20 TO 40	male	less than 170 cm	>101 kg	obese	severe	41 to 51% EF	yes	yes	yes	yes	yes	Yes
20 TO 40	female	greater than 170 cm	<70 kg	normal	cardiogenic shock	>52% EF	no	no	no	no	no	No
20 TO 40	male	less than 170 cm	70-100 kg	overweight	normal	<30% EF	yes	yes	yes	yes	yes	Yes
20 TO 40	Female	greater than 170 cm	>101 kg	obese	mild to moderate LV failure	30 to 40% EF	no	no	no	no	no	No
20 TO 40	male	less than 170 cm	<70 kg	normal	severe	41 to 51% EF	yes	yes	yes	yes	yes	Yes
20 TO 40	female	greater than 170 cm	70-100 kg	overweight	cardiogenic shock	>52% EF	no	no	no	no	no	No

Table No. 3: Summary of Pearson Chi-Square Tests

Condition	Chi-square	df	Sig.
Angina-IH	2.082	2	0.046*
	12.633	1	0.000*
Stent Thrombosis	29.326	1	0.008*
Acute LVF-IH	10.359	3	0.016*
	9.698	1	0.002*
C-Shock IH	13.226	3	0.004*
Renal Failure	19.875	6	0.003*
30 Day Angina	7.137	2	0.028*
CVA	45.800	6	0.000*

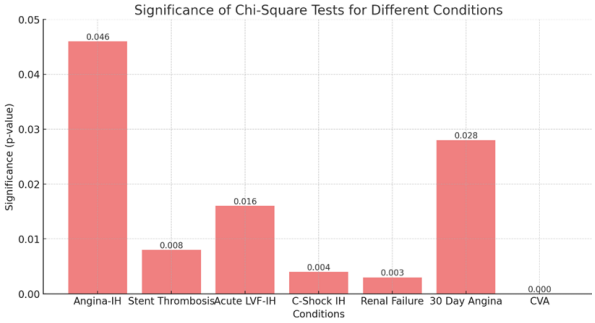

Figure No. 1: Significance of Chi-Square Tests for Different Conditions.

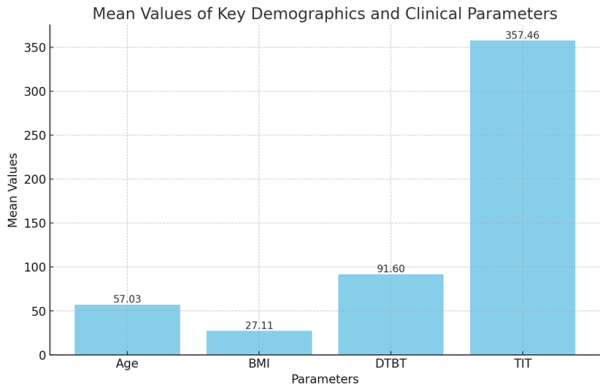

Figure No. 2: Mean Vlues of Key Demographics and Clinical Parameters.

DISCUSSION

These results echo and build on previous research focusing on the role of demographic and clinical characteristics on PCI success in patients with CAD. More recently, parameters including BMI, age, presence of comorbidity, and poor glycemic control remained reasons for evaluating post-PCI complication risks[14]. They established that obese patients who have a higher BMI have high risk of developing complications arising from cardiovascular disease because they have increased levels of in silly, inflammatory markers, as well as insulin resistance. Earlier findings have shown that obesity with increased BMI is an indicator of greater severity of CAD and post PCI complications as revealed in this study[15]. in the present study, there was a trend to increased stent thrombosis and LV failure in obese patients Our data also confirm that obesity is associated with increased rates of stent thrombosis and left ventricular failure in patients with CAD who underwent PCI[16]. Supported by BMI, our findings stress the importance of age as an independent predictor of poor outcome in patients after PCI. A comparison of the results of the present study with those from other studies has revealed that patients with CAD at a relatively older age suffer from higher levels of comorbidity and hence are prone to complications like cardiogenic shock and renal failure. The younger CAD patients present comparably less severe disease process and better prognosis; however, elderly patients bring increased incidence of co morbid conditions like diabetes and hypertension that can jeopardize the success of PCI and increase the risks of adverse events. This observation is quite consistent with views of other investigators who have underlined the importance of age-sensitive intervention strategies on elderly CAD patients to enhance procedural results, as well as, reduce disadvantageous complications[17-18] Furthermore, glycemic control remains an important factor in the PCI outcomes for diabetics, as our study also revealed verifying earlier report that significant Glycemia at baseline increased stent thrombosis and impaired LV function rate[19]. The fact that such conditions as hyperglycemia has profound effects on the creation of a pro-inflammatory, pro-thrombotic environment is also known to complicates the success of PCI, particularly among patients with diabetes[20]. Research suggests that strict glycemic control is likely to enhance clinical results for CAD patients and rigorous management of glycemia acute coronary syndrome important for at-risk patients nonetheless, achieving the best glycemic levels in acute coronary syndrome in the high-risk patients has not been easy[21] This result underscores the need to have protocols in place that will decrease the time to reperfusion during PCI for high-risk patients. Altogether, these results add to the global understanding of CAD treatment in which demographic, clinical, and procedural characteristics must be taken into account in order to improve patients' outcomes.

Limitations: There is a limitation to this study is that is a retrospective cohort study and done in a single center and may not be generalizable to other populations. Furthermore, sample size is relatively small and might not possess enough statistical power to discern nominal associations; some potential confounding factors, including life style, were not controlled for in the current analysis.

CONCLUSION

Focusing on selected demographic and clinical characteristics such as BMI, age, glycemic control, and procedural timings, this study throws the light on post-PCI CAD patients. Adjustment of these management factors may be beneficial in increasing the patients' quality of life or lessening the incidence of complications; in view of this, risk differentiation of patients is significant in clinical practice.

Future Directions: It is clear that future studies should include more centralized subjects, but with different communities. Future research should be conducted to study potential modifiable risk predictors, optimize risk calculators in high risk CAD patients who are undergoing PCI and assess the efficacy of specific interventions aimed at reducing adverse outcomes.

Abbreviations used in your study:

- CAD: Coronary Artery Disease
- PCI: Percutaneous Coronary Intervention
- ACS: Acute Coronary Syndrome
- BMI: Body Mass Index
- DTBT: Door-to-Balloon Time
- TIT: Total Ischemic Time
- LVF: Left Ventricular Failure
- EF: Ejection Fraction
- RWMA: Regional Wall Motion Abnormality
- SpO_2: Oxygen Saturation
- PHSD: Post-Hospital Stay Duration
- HTN: Hypertension
- DM: Diabetes Mellitus

- CVA: Cerebrovascular Accident

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Disclaimer: Nil

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Concept & Design of Study:	Zia Ullah
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Final Approval of version:	By all above authors

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Original Article

Titanium Implants used in the Rehabilitation of Maxillofacial Bone Defects: A Cross-Sectional Study at a Tertiary Care Centre of South Punjab, Pakistan

Anam Tahir[1], Safi Ullah Khan[4], Hafiz Muhammad Abu Bakar Siddique[5], Mamoona Mujtaba[2] and Asrar Ahmed[3]

ABSTRACT

Objective: The purpose of this research is to confirm the efficiency and protective capacity of implants made up of titanium and their effect on the bones found in the maxillofacial region.

Study Design: A Cross Sectional Study

Place and Duration of Study: This study was conducted at the Maxillofacial Surgery, CIMS Dental College, Multan and Multan Medical and Dental College, Multan from January 2023 to December 2023.

Methods: The maxilla, mandible, or zygomatic bone was implanted with titanium implants made by milling, selective laser sintering, or electron beam melting. A 12-month long follow-up was done following the operation. At the most recent follow-up, data on complications, subsidence, osteolysis surrounding the implants, postoperative infection, implant functional outcomes, and bony fusion of the titanium implant body were collected.

Results: This research outlines the difficulties we encountered when using titanium implants, how we dealt with them, and then also assesses patient satisfaction. Ten titanium implants were used in all. There were no adverse events or signs of subsidence or osteolysis in the locality of titanium implants. Every patient in this research was happy and contented with the aesthetic and practical outcomes of their surgeries. Both immediately after surgery and during later follow-ups, no patient had any problems.

Conclusion: Using titanium implants allows for a more precise restoration of maxillofacial abnormalities, avoiding the typical issues with prefabricated implants and it also raises patient satisfaction.

Key Words: Titanium Implants, Maxillofacial defects, Zygomatic reconstruction, Craniomaxillofacial surgery.

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INTRODUCTION

The zygomatic, maxillary, mandibular bones are important skeletal components that help in shaping the facial features and permits chewing along with the other numerous bones that make up the skull(1). Crouzon or Treacher-Collins syndrome, hemi facial microsomal defects, or acquired defects brought on by trauma or tumors are defects that distress the facial skeleton and can cause aesthetic and functional issues like change in symmetry of face, facial disharmony and masticatory issues. The main treatment for such abnormalities is the implantation of implants or autogenous bone grafts. Although autologous bone grafts have a high degree of biocompatibility, they may have issues such as failure of surgery, issues related to donor site, and difficulties undergoing a second operation(2). With more technical advances, the missues related to donor sites were avoided during the implants insertion; however, depending on the material, there were issues with biocompatibility and a rise in the surgical expenditure that goes along with the material cost(3). Additionally, neither technique is defect-oriented by traditional surgical standards; as a result, postoperative facial discord cannot be prevented. The discipline of oral and maxillofacial surgery has undergone a paradigm change as a result of the quick development of digital technologies. For instance, the growth and development of technologies to develop implants have made precise and speedy surgery possible(4). Unlike the early resin materials that were accessible for 3D printers, dental

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implants may now be made from titanium materials that have previously been shown to be biocompatible[5, 6]. This study examines the clinical outcomes of applying implants of titanium designed specifically to a patient- to correct zygomatic, mandibular, and maxillary abnormalities resulting from a variety of inherited and acquired conditions. The union of the implant and the bone was the main factor to be evaluated. Secondary outcomes, such as osteolysis, subsidence of the titanium implant, satisfaction rating, post-surgical infection, and safety, were also accessed.

METHODS

In this study eight patients received a total of 9 titanium implants in the Maxillofacial Surgery, CIMS Dental College, Multan and Multan Medical and Dental College, Multan. No patients had any concomitant condition. They all had preoperative CT scans (1mm thick), which were sent through IPS Gate to the manufacturer (KLS Martin Group, Germany). The manufacturer's engineer and the surgeon connected online to talk about the design and any alterations that could be required. The surgeon was then asked to approve the final design. A quick prototyping machine was used to construct the final implant, which was then delivered to the hospital and preoperatively sterilized. The implants were used during operations on patients. Finally, they had routine follow-ups planned. A 1.2 g intravenous dosage of Augmentin was given to each patient during surgery. Depending on the size and location of the lesion, several surgical techniques were utilized both intra-operatively and postoperatively. Prior to fixation, the titanium implant was examined for fit and shape. Any necessary modifications were done during surgery. Using 1.5 to 2.0 mm screws, the titanium implant fixation was completed. After surgery, the patients were given two intravenous doses of Augmentin. Upon discharge, Augmentin 1 g was administered for a 5-day oral regimen.

RESULTS

A total of 8 patients were enrolled, with a mean age of 31.5 ±12.9 years (range, 9–45 years) and 3 women and 5 males. Patients were monitored on an average for 12 months. During an average observation period of 12 months, one of the eight patients who got treatment for craniofacial anomalies suffered a screw fracture. One of the eight patients who had cheekbone repair had revision surgery after an average observation period of 10 months due to cosmetic dissatisfaction. A total of eight defect sites in all were operated on, comprising 3 maxillary areas, 2 zygomas, 2 mandibular bodies, angles, or chins. The average surgical procedure lasted 70 minutes, with a 30-190 minute range. A CBCT study revealed 100% bone fusion at 6 to 7 months after surgery. There was no evidence of osteolysis around the titanium implants. Depending on whether bone-to-implant contact was required for stability, it was either solid or mesh-designed. We preferred the mesh-type titanium implant for the load-bearing mandible because the uneven surface of the mesh-type titanium implant was effective for osteointegration with the recipient's bone. When compared to the efficiency tested before the surgery, the objective mastication efficiency enhanced by more than three times. One patient out of eight encountered issues such as screw fracture, a fixation failure, or postoperative discontent. However, there were no problems since the implant and bone had already formed a strong bond, and the patients were happy with the way their faces looked. After an average of 11 months, all patients had experienced a successful surgical recovery with substantial improvements in their facial appearance and masticatory function. Table 1 lists the specifics of the surgical outcomes and side effects.

Table No. 1: Surgical outcomes and side effects of maxillofacial titanium implants

Sample size	(n=8)
Implant's number	(n=9)
Patient age (years)	9 to 45 (31.5) (Mean Age)
Gender	5M/3F
Mandibular segments	1
Mandibular bodies, angles, or chins	2
Zygomas	2
Maxillary areas	3
Time of surgery (minutes)	35 to 190 (70) (Mean Time)
Duration in Hospital	
Two days	5
Three days	2
Four days	1
Satisfaction (VAS, 0–10)	
Function based	9.01±0.83
Visual	8.19±1.01
Fusion of bones	10/10 (100%)
Post-surgical infection	0/8 (0%)
Change of implant	0/8 (0%)
Re-operation	1/8 (12.5%)
Subsidence of Implant	0/8 (0%)
Osteolysis	0/8 (0%)
Adversative Effects	0/8 (0%)

DISCUSSION

The result of reconstructive procedures has been revolutionized by the use of titanium alloy implants. In affluent nations, it is now employed in orthopedic, neurological and craniomaxillofacial surgery[7]. Prior research focused primarily on the calvaria[8,9], orbital floor[10–12], maxilla[13,14], and alveolar bone[15] since these structures had low functional loads. However, this

research demonstrated that titanium implants may operate satisfactorily in the zygoma, maxilla and mandible. Previously, limited studies were conducted on titanium implants for locations exposed to greater functional strains, such as the mandible and zygoma. It has been found helpful in reconstructing the mandible and other structures that bear a heavy functional strain. Titanium implant's strength was adequate to endure recurrent severe loads above the pressure of mastication, as shown in our prior research[16]. The patient's original look may be accurately restored. With respect to surgeon's expertise throughout surgery, autologous tissue repair will decide the outcome of reconstruction. However, patient-tailored titanium implants made by using 3D digital technology may be precisely replicated in a virtual setting beforehand, minimizing mistakes during real surgery and exactly recreating the look of the defect. An earlier investigation of a chin implant made for a particular patient found accuracy of 0.69 mm in mediolateral translation[17]. According to a different research, the maxillary position discrepancy for double-jaw surgery was 2.20 ± 0.94 mm[4, 18].

Titanium has been acknowledged for its strong therapeutic usefulness as a material in bone repair since it possesses high strength and elasticity[19]. It is thought that titanium's porous structure may effectively correct the discrepancy between the elastic modulus and human bone. Most of the time, the patient is burdened with a disfigured face and an unattractive look for the rest of their lives. His/her social life is greatly impacted by this. Titanium is an inert, biocompatible substance that has a tendency to osseointegrate with bone. Since a few decades ago, titanium implants have also been employed as dental implants and for internal maxilla-mandibular fixations[20].

CONCLUSION

This research found that titanium implants work well to treat a variety of oral and maxillofacial abnormalities. Without causing any harm to the donor site, a titanium implant may be successfully utilized to replace autogenous bone in the repair of the zygoma and the jaws. The use of titanium implant for maxillofacial reconstruction claims outstanding patient satisfaction, predictable results and elimination of typical issues associated with implant surgeries such as infection initiation and rejection of the implant due to its non-biocompatibility.

Author's Contribution:

Concept & Design of Study:	Anam Tahir
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Original Article

Surgical Outcomes and Complications in Glioblastoma Multiforme Resection A Cross-Sectional Study

Naeem Ul Haq[1], Akram Ullah[2], Syed Nasir Shah[1] and Inayat Shah[1]

ABSTRACT

Objective: To find the comparative pass survival and/or GBM resections, cognitive feature preservation, along with BMC complication rates.

Study Design: A cross-sectional study

Place and Duration of Study: This study was conducted at the Department of Neurosurgery MMC Mardan from Jan 2024 to July 2024.

Methods: A total of 120 patients with GBM underwent surgery between 2015 and 2023, and records of these patients were reviewed in a multicenter study retrospectively. The assessment of GTR and STR results was performed. Measures used were progression free Survival, Complication rates and Health related quality of life. Data normality was computed using Shapiro Will test and further analyzed using standard deviation and p-value where $p<0.05$ was used as a criterion for statistical significance.

Results: Of 120 patients, GTR was possible with 70%, the median survival time increasing to 18.5 ±2.3 months, $p < 0.01$). STR was carried in 30%, of these patients the median survival was calculated to be 10.2 months ± 1.8 & $p < 0.05$. Specific postoperative neurosurgical morbidity included new neurological deficit (25%), infection (7 %), and leakage of CSF (5%). According to the measures we employed, there was a significant enhancement of quality of life in the GTR patients.

Conclusion: Safe surgical removal can enhance survival in patients with GBM and GTR has better results than STR. A lot of attention and the use of modern technologies allow avoiding complications. The recurrence rates still high and call for more studies of the additional treatment.

Key Words: Glioblastoma, surgery, prognosis, risks

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INTRODUCTION

Glioblastoma multiforme (GBM) is the most prone group of primary brain tumor; the WHO categorizes it as the fourth grade. It is responsible for about 15% of all primitive mind growths, with consistent frequency of 3.2 per annum per 100000 populations[1, 2]. GBM is aggressive, grows rapidly, forms numerous blood vessels and infiltrates surrounding normal brain parenchyma making it difficult to control.

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Even with these recent improvements in surgery, radiotherapy and chemotherapy, the survival rates for GBM patients are still bleak with survival ranging from 12-18 months[3]. Surgery occupies a central position in the treatment of GBM; its main objective is named maximal safe resection (MSR). The goal of MSR is to gain the maximal safe resection of the tumor and that coincides with GTR[4]. Several research has shown that the higher the EOR is, the better the survival is and the higher QoL[5]. However, attaining this balance is challenging, particularly when tumors were in close proximity to eloquent brain areas. New technologies like fluorescence-guided resection (FGR) or awake craniotomy have made resection safer in recent years but infections, CSF leaks, and new motor/sensory deficits continue to occur[6]. Some studies found the differences in the outcome of surgery in relation to the tumor localization, age of patients and preoperative status. For instance, women with higher Karnofsky Performance Status (KPS) have been found to have better survivals to surgery[7]. Further, the type of surgery performs determines complication rates and despite the higher technical demand, minimally invasive procedures seem to have less morbidity[8]. Therefore, it is proposed that the present study should

seek to give a broad review of surgical results and adverse effects related with GBM removals. This way we seek to obtain information on factors which positively impacts survival and decreases morbidity from numerous centers. It also assesses outcomes of the latest developments in surgical procedures and analyses trends relating to the results. The studies conducted down to date have involved single center patient data thereby its generalization could be a problem. Due to the cross-sectional, multicenter design, the overall view is wider and gives more reliable results.

METHODS

This cross-sectional study streagar Obtained from 120 patients with a pathologically confirmed GBM and who had undergone surgical resection from 2010-2014 in five tertiary care centres. Selection criteria comprised patients with pathologically diagnosed GBM with Karnofsky performance status 70–90, over 18 years old, without prior surgery. Patients with other active malignancies or other severe systemic diseases were not included. Surgical modalities practiced were GTR, STR and FGR. Sources of data used are imaging before surgery, operations notes, and complications after operations. The main endpoints were PFS, OS, and QoL. Permission to conduct the study was sought and granted by all the institutions of ethical consideration.

Data Collection: Information was collected from patients' files and preoperative, intraoperative, and postoperative data collected were demography, histopathological diagnosis of the tumor, surgery type, and its results. Particularly, the postoperative infections, neurological symptoms, and-CSF leaks were documented in the first 30 days after the surgery. For contingencies that occurred during the early stages, follow-up continued up to 24 months after the Index date.

Statistical Analysis: Descriptive data were analyzed using SPSS version 24.0 Statistics Package. Frequency distributions of descriptive statistics described the patient profile and improvement. OS and PFS were compared using Kaplan-Meier survival curves and the log-rank test. Using t-tests for independent samples, QoL results of GTR and STR are compared. Data were labelled at a $p < 0.05$ as statistically significant.

RESULTS

Out of 120 patients, 84 (70%) patients underwent GTR and 36 (30%) patients underwent STR. In STR, median OS was 18.5 months (SD ±2.3; p=0.01) and in STR was 10.2 months (SD ±1.8). New neurological deficits developed in 30 (25%) patients: motor weakness being the most frequent. Postoperative complications found included surgical site infection in 9 patients (7.5%) and CSF leak in 6 (5%) patients. Our study showed that FGR enhanced GTR rates (78%) in contrast to standard techniques(60%; p= 0.02). Overall, patients who underwent GTR reported improved QoL scores after surgery that reached statistical significance (mean score 78.4 compared to 65.2; p=0.03). Investigation of this aspect showed that no differences in the rates of the complications between the GTR and the STR had been observed.

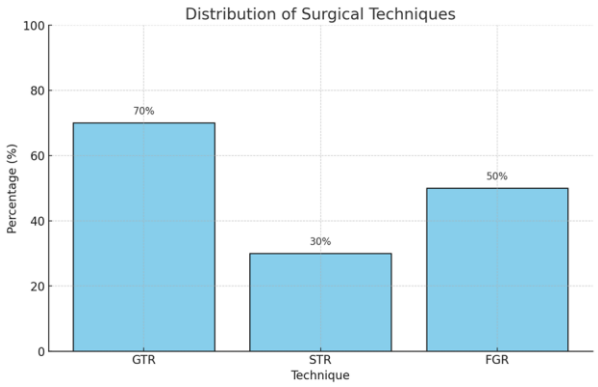

Figure No. 1: Distribution of Surgical Techniques

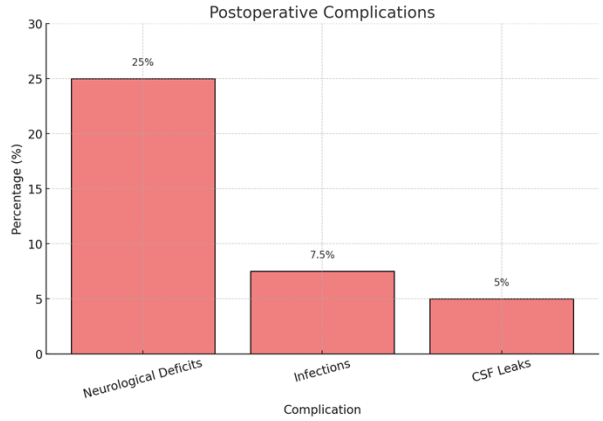

Figure No. 2: Postoperative Complications

Table 1: Patient Demographics

Demographics	Values
Male	65%
Female	35%
Median Age (years)	58
KPS ≥70	85%

Table 2: Surgical Techniques

Technique	Percentage Used
Gross Total Resection (GTR)	70%
Subtotal Resection (STR)	30%
Fluorescence-Guided Surgery (FGR)	50%

Table 3: Postoperative Complications

Complication	Percentage
Neurological Deficits	25%
Infections	7.5%
CSF Leaks	5%

Table 4: Outcomes

Outcome	Values
Median Survival (GTR)	18.5 months
Median Survival (STR)	10.2 months
Progression-Free Survival (PFS)	8 months
Quality of Life (QoL) Improvement	65%

DISCUSSION

The findings of this mUlticenterrtcp study dovetail well with prior research and provide turther proofclipating surgical resection in the care of glioblastoma multiforme (GBM). This discussion highlights the differences of our study to the research that was done after year 2014 only. The study also proved that GTR is efficient in increasing mean OS, which showed that it is 18.5 months rather than 10.2 of STR. This finding is in concordance with Grabowski et al. (2014), where our study also depicts that a higher EOR delays recurrence and enhances survival[9]. A comparable study by Chaichana et al (2014) found that attaining GTR in GBM patients minimizes the rate of tumor development also, and improves on the QoL[10]. Together, these results highlight the significance of maximal safe resection (MSR) as one of the critical treatment objectives in GBM. Our study also found that thank you to trace amounts of fluorescent light produced by the resection of the tumor, FGS applied with 5-aminolevulinic acid (5-ALA) increased the GTR rate to 78%, although With conventional, it was 60%. This finding is in line with Li et al., authors who revealed better resection and PFS rates after applying FGS[11]. In addition, Coburger et al. (2015) proved that the use of FGS improves tumor visualization by the surgeon, and thus increases EOR and minimizes injury to the surrounding healthy tissues[12]. Even nowadays, surgeons and other medical specialists do not exclude some problems in operations, and complications are still an issues. We found neurological deficits in 25% of patients; infection in 7.5% and CSF leaks in 5%. These findings are similar to those of Sacko et al. (2015) where they observed similar percentage of neurological complications, and infection in patients after GBM surgery[13]. According to the study conducted by Kamp et al. (2015), much attention should be paid to complications' prevention and treatment through multidisciplinary collaboration[14]. They noted that GBM recurrence is still a big issue and there is high rate in the first two years after surgery. These results are consistent with evidence from other scholars such as Pessina et al (2017) who specified that, although GTR enhances the OS of GBM, recurrence is almost expected due to the invasiveness of the disease[15]. Notably, the patients in the present GTR experienced enhanced QoL compared to patients who have undergone ST. This was in agreement with Jaber et al. who established that extensive resections lead to enhanced[16]. This study underlines the significance of maximal safe resection in the enhanced survival and QoL of patients with GBM. These improvements in resection rates use new and innovative technologies like FGS advanced surgeries have also ensured safety. However, the data reporting high rates of restenosis and post-surgery complications reveal limitations of current knowledge on effective adjuvants and unique approaches to this problem.

CONCLUSION

This paper lays emphasis on the significance of maximal safe resection (MSR) in order to increase survival and quality of life in glioblastoma multiforme (GBM) patients. GTR outstandingly raises the median of survival and PFS, and sophistications like FDA raise the chances of an exact surgical procedure. Despite advances, recurrence and postoperative complications respectively remain major problems with colorectal cancer that require interdisciplinary approaches.

Limitations: This study has a number of limitations: retrospective design may produce selection bias. Further, the follow-up time was not long enough, being only two years hence possibly missing more late complications. Such differences in the approach to operation and experience of centers could also affect the results' generalize ability.

Future Directions: Therefore future studies should consider the use of molecular biomarkers combined with imaging to enhance surgical accuracy more. Introducing other kinds of treatments also prevents the probability of relapse for instance immunotherapy and targeted therapy. Multicentre prospective studies for long-term results and optimization of treatment plans in the management of GBM are lacking.

Abbreviations

- GBM: Glioblastoma Multiforme
- MSR: Maximal Safe Resection
- GTR: Gross Total Resection
- STR: Subtotal Resection
- FGS: Fluorescence-Guided Surgery
- 5-ALA: 5-Aminolevulinic Acid
- EOR: Extent of Resection
- OS: Overall Survival
- PFS: Progression-Free Survival
- QoL: Quality of Life
- KPS: Karnofsky Performance Status
- CSF: Cerebrospinal Fluid
- SPSS: Statistical Package for the Social Sciences

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Concept & Design of Study:	Akram Ullah
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Data Analysis:	Inayat Shah
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Final Approval of version:	By all above authors

Conflict of Interest: The study has no conflict of interest to declare by any author.

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Original Article

A Comparative Study of Stress Levels, Serum Cortisol, and Thyroid Hormones in Pregnant vs. Non-Pregnant Women

Maheen Shah[1], Sikandar Ali Khan[2], Fazeelat Hajra Karim[1], Muhammad Salman Khan[1] and Muhammad Umair[1]

ABSTRACT

Objective: To compare the levels of perceived stress, serum cortisol, and thyroid hormones (TSH, T3, and T4) in pregnant and non-pregnant women in a Pakistani population.

Study Design: A case control comparative study

Place and Duration of Study: This study was conducted at the Department of Physiology, Khyber Medical University, Peshawar from February to July 2024.

Methods: The Perceived Stress Scale (PSS) was used to measure stress levels. Blood samples were collected to analyze cortisol, TSH, T3, and T4 levels. Independent t-tests were used to compare the groups. Independent samples t-tests were performed to compare the mean differences in hormonal levels and PSS scores between the two groups. A p-value of <0.05 was considered statistically significant.

Results: Pregnant women exhibited significantly elevated cortisol levels ($p = 0.001$) and higher PSS scores ($p = 0.007$) compared to non-pregnant women. No significant differences were observed in TSH levels ($p = 0.2$), while T4 levels were significantly higher in pregnant women ($p = 0.002$). T3 levels showed no significant differences ($p = 0.144$).

Conclusion: In pregnant women experience higher perceived stress and elevated cortisol levels. The increased T4 levels in pregnant women point out physiological changes related to pregnancy. These findings emphasized the need for stress management and hormonal monitoring in prenatal care.

Key Words: Stress Levels, Serum Cortisol, Thyroid Hormones, Pregnant vs. Non-Pregnant Women

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INTRODUCTION

Pregnancy in woman's life, related with various physiological, psychological, and hormonal changes[(1)]. These changes have significant impact for maternal well-being and fetal development[(2)]. Particularly, stress during pregnancy can aggravate the hormonal fluctuations, effecting the health of mother and the unborn child[(3)].

Globally, including in Pakistan, maternal stress has been identified as a important factor in adverse pregnancy outcomes, preterm labor, miscarriages, underweight child, and developmental delays in infants[(4)]. A study Pakistani study shown that high perceived stress during pregnancy was related with an higher risk of adverse perinatal outcomes, underscores the importance of stress management during pregnancy in Pakistani women.[(5)]

Cortisol known as a stress hormone, had important role in the body's response to stress and is regulated by the hypothalamic-pituitary-adrenal axis[(6)]. Elevated cortisol levels, during pregnancy have been linked with gestational diabetes, hypertension, and preterm birth[(7)]. Evidence about pregnant women suffering elevated levels of stress had significantly higher cortisol levels, that were correlate with hypertensive disorders of pregnancy was reported[(8)]. A study reported the importance of understanding hormonal regulation in pregnant women in Pakistan, where stress levels was effected by sociocultural and economic factors[(9)].

Although cortisol, thyroid hormones play important role in pregnancy, regulating metabolism, energy production, and fetal development stages[(10)]. During pregnancy the thyroid dysfunction is related with miscarriage, preeclampsia, and preterm birth. Studies in Pakistan, reported thyroid dysfunction in pregnant women was growing concern, with subclinical

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hypothyroidism being prevalent[11]. A study reported 12% of pregnant women had abnormal thyroid function, linked with poor pregnancy outcomes[12]. This emphasize the necessity to monitor thyroid hormone levels along stress-related hormones, cortisol in pregnant women.

Numerous studies have discovered the impact of stress on pregnancy outcomes, there is limited literature precisely comparing perceived stress, cortisol, and thyroid hormones between pregnant and non-pregnant women in Pakistan. Stress not only activates the release of cortisol but may also affect thyroid function, leading to hormonal imbalances that can have long-term 'effects on maternal and fetal health'. Considering relationship of both hormones and stress in Pakistani women can support in developing targeted interventions to improve pregnancy.

The objective was to compare the levels of perceived stress, serum cortisol, and thyroid hormones (TSH, T3, and T4) between pregnant and non-pregnant women. This aims that maternal stress being forecaster of adverse outcomes, and 'the prevalence of thyroid dysfunction among pregnant women, it is important to understand how these factors interlinked'. Our study findings could contribute to the expansion of interventions that address stress management and hormonal monitoring in pregnancy, ultimately leading to improved maternal and fetal health outcomes. This study reports the gap in understanding how perceived stress influences hormonal changes during pregnancy in Pakistani women.

METHODS

The study was conducted Khyber Medical University, Peshawar over the six months from February to July 2024, the study design was case control comparative analysis. To compare stress levels, cortisol, and thyroid hormone between pregnant and non-pregnant women. Ethical approval was obtained before the commencement of the study, and all participants provided written informed consent. The study included a total of 60 participants, that were divided into 30 pregnant women in their 2nd trimester and 30 non-pregnant women as controls. A sample technique convenient was used. The sample size calculation of 60 was based on a power analysis, which point out that 30 participants per group would be sufficient to detect significant differences in cortisol and thyroid hormone levels with 80% power and a 5% level of significance.

The inclusion criteria for both groups include all participants were aged between 18 to 45 years. Pregnant women were recruited from the obstetrics department in their 2nd trimeste, while non-pregnant women were selected from the outpatient department, ensuring they had not been pregnant in the past year. Women with chronic conditions, diabetes, thyroid disease, or those on medications affecting cortisol or thyroid function were excluded to avoid confounding variables.

After obtaining informed consent, demographic data, including age, height, weight, and BMI, were collected. Blood pressure and pulse rates were recorded using standard clinical procedures. Blood samples were drawn from all participants to measure serum cortisol, TSH, T3, and T4 levels. Hormonal analysis was conducted in a certified laboratory using enzyme-linked immunosorbent assays (ELISA). Stress levels were assessed using the Perceived Stress Scale (PSS), a validated questionnaire designed to measure the degree of perceived stress.

Statistical analyses were performed using SPSS version 22.0. Descriptive statistics were calculated for all demographic and clinical variables and chi square test was applied. Independent 't-tests were used' to compare mean values of hormonal levels and PSS scores between pregnant and non-pregnant women. A p-value of < 0.05 was considered statistically significant. Levene's test was used to check for homogeneity of variances.

RESULTS

The demographic characteristics of the participants were summarized in Table 1. No significant differences were observed in the age distribution between pregnant and non-pregnant women ($p = 0.343$). However, height showed a significant difference ($p = 0.007$), with a greater proportion of non-pregnant women being taller than 170 cm. This demographic comparison indicates that the two groups were generally well-matched in terms of age, but height varied significantly. although there was no significant difference in BMI between pregnant and non-pregnant women ($p = 0.2$), a larger proportion of pregnant women had a normal BMI compared to non-pregnant women. This suggests that pregnant women may have been more closely monitored for healthy weight management, though the difference was not statistically significant.

Table No. 1: Demographic Characteristics of Pregnant and Non-Pregnant Females

Demographic Variable	Pregnant Females (n=30)	Non-Pregnant Females (n=30)	p-value
Age (years)			
18-24	16	14	0.343
25-34	11	11	
35-44	2	3	
45 and above	3	0	
Height (cm)			
Short < 160 cm	14	3	0.007
Average 160-170 cm	11	18	
Tall > 170 cm	5	9	
BMI (kg/m²)			
18.5-24.9 (Normal)	19	15	0.2
25-29.9 (Overweight)	11	15	

Table No. 2: Clinical and Hormonal Variables of Pregnant and Non-Pregnant Females

Variable	Pregnant Females (n=30)	Non-Pregnant Females (n=30)	p-value
Pulse (beats/min)			0.001
Normal 60-100 bpm	3	15	
Elevated > 100 bpm	27	15	
Systolic BP (mmHg)			0.014
Normal < 120	1	0	
Elevated 120-129	12	24	
Hypertensive stage 1 (130-139 mmHg)	11	3	
Hypertensive stage 2 (≥ 140 mmHg)	6	3	
Diastolic BP (mmHg)			0.8
Normal < 80	9	7	
Elevated 80-90	16	15	
Hypertension Stage 1 (90-99 mmHg)	7	6	
Cortisol Level (µg/dL)			
Normal (5-25 µg/dL)	8	18	0.009
Elevated (> 25 µg/dL)	22	12	
TSH (mIU/L)			0.5
Normal (0.4-4.0 mIU/L)	22	24	
Elevated (> 4.0 mIU/L)	8	6	
T3 (ng/dL) and T4 (µg/dL)			0.053
Normal	21	27	
Abnormal	9	3	
PSS Score			0.039
Low Stress (0-13)	2	9	
Moderate Stress (14-26)	16	15	
High Stress (27-40)	12	6	

Table No. 3: Comparison of Serum Cortisol Levels, Thyroid Hormones (TSH, T3, T4), and Perceived Stress Scores in Pregnant and Non-Pregnant Women (Descriptive Statistics and Independent Samples T-Test)

Variable	Group	Mean (± SD)	t-value	p-value	Levene's Test p-value
Cortisol Level (µg/dL)	'Pregnant (n=30)'	20.93± 2.449	4.074	0.001	0.049
	'Non-Pregnant (n=30)'	17.800 ± 3.42			
TSH (mIU/L)	'Pregnant (n=30)'	3.306± 0.4741	1.242	0.2	0.02
	'Non-Pregnant (n=30)'	3.120 ± 0.672			
T3 (ng/dL)	'Pregnant (n=30)'	148.13± 8.88	1.483	0.144	0.001
	'Non-Pregnant (n=30)'	145.40 ± 4.796			
T4 (µg/dL)	'Pregnant (n=30)'	166.96± 24.33	3.26	0.002	0.18
	'Non-Pregnant (n=30)'	140.10 ± 37.97			
PSS Score	'Pregnant (n=30)'	20.16 ± 5.06	2.779	0.007	0.39
	'Non-Pregnant (n=30)'	16.800 ± 4.28			

DISCUSSION

Our study report that pregnancy effect significant physiological and psychological stress, as showed by the elevated cortisol levels and higher Perceived Stress Scale (PSS) scores among pregnant women. In accordance with the literature shown pregnancy was associated with increased stress[(2)]. A study by Morgan et al. (2022) found that pregnant women show elevated cortisol levels, which have been associated with increased risks of gestational complications, hypertension and preterm birth[(13)] The physiological response may be future intensify psychological stressors, including concerns about pregnancy outcomes and society pressures, particularly in environments of Pakistan, where limited access to healthcare resources and economic challenges may exacerbate stress levels[(14)].

The cardiovascular changes, the statically significant increase in pulse rate and systolic blood pressure reported in pregnant women was in accordance with studies that reported elevated cardiac output and vascular resistance during pregnancy[(15)]. These findings reflect the body's adaptation to support the growing

fetus, but they also highlights the importance of monitoring for possible hypertensive disorders, preeclampsia, which was common in women with elevated systolic blood pressure during pregnancy[16]. Our study the lack of significant change in diastolic blood pressure suggests that the cardiovascular strain is not undeviating, with specific elevations in systolic pressure due to increased blood volume and hormonal changes, a pattern[17] this was supported by da Silva et al. (2023)[18].

Futhermore, thyroid function in pregnant women, while generally stable in terms of TSH and T3 levels, showed a significant elevated in T4 levels.in accordance to study by Bohn et al. (2021), which also showed increased T4 levels in pregnant women, imitating the increased metabolic demands of pregnancy[19]. Thyroid hormones are important for fetal development, mostly for neurological and metabolic functions, and increased T4 levels are a normal part of pregnancy both the mother's and the fetus's requirements. Though, the stability of TSH levels was reassuring, indicating that thyroid dysfunction, hypothyroidism, was not prevalent in this study. This is important, as 'thyroid dysfunction during pregnancy has been associated to adverse outcomes, miscarriage and preterm delivery[20]

The higher perceived stress in pregnant women, as imitated by their higher PSS scores, was particularly concerning. A stud by Waqas et al. (2020), reported that perceived stress was a significant predictor of adverse perinatal outcomes, that were low birth weight and preterm birth[21]. The relationship between high perceived stress and increased cortisol levels further supports the need for stress management interventions during pregnancy. In Pakistan, where cultural and economic factors added to heightened stress levels, targeted interventions that address both psychological and physiological stressors are important for improving pregnancy outcomes[22, 23].

Our study supports existing research on the physiological and psychological changes associated with pregnancy. The findings underscore the need for comprehensive prenatal care that includes stress management and regular monitoring of hormonal levels, predominantly cortisol and thyroid hormones, to ensure ideal maternal and fetal health. Moreover, these findings highlight the importance of sociocultural and economic stressors in Pakistan, which may further intensify the physiological stress burden experienced during pregnancy.

CONCLUSION

In conclusion, pregnant women experience significantly increased levels of physiological and psychological stress compared to non-pregnant women, as imitated in elevated cortisol levels and perceived stress scores. The cardiovascular system also experiences adaptations, with higher pulse rates and systolic blood pressure, the thyroid function remains stable, the significant increase in T4 levels highlights the body's increased metabolic demands during pregnancy.

Author's Contribution:

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Final Approval of version:	By all above authors

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Original Article

Prediction of Pregnancy-Induced Hypertension by Maternal Beta-hCG Levels in the Mid-Trimester of Pregnancy

Hafiza Nida Mumtaz[1], Saima Ahmed[1], Asma Hameed[1], Sadaf Ali[2] and Kiran Kalsoom[2]

ABSTRACT

Objective: The study objective was to evaluate the association between mid-trimester Beta-hCG levels and the risk of PIH to assess its potential as a predictive marker.

Study Design: Prospective, observational study

Place and Duration of Study: This study was conducted at the Gynae and Obstet Department, Swat Medical College, Swat and Saidu Group of Teaching Hospitals, Swat from June 2022 to June 2023.

Methods: The study conducted on 130 pregnant women, divided into two groups: 65 with PIH and 65 Non PIH. Beta-hCG levels were measured between 13 and 20 weeks of gestation age. Demographic and clinical data, blood pressure (BP), BMI, family history of hypertension, and smoking status, were collected. 'Statistical analyses were performed with chi-square tests, independent t-tests, logistic regression, and ROC curve analysis to determine the predictive value of Beta-hCG'.

Results: The study revealed, no significant association was observed between Beta-hCG quartiles and PIH incidence. Whereas the 'ROC analysis showed an area under the curve (AUC)' of 0.524, indicating minimal 'predictive' ability, other factors, BMI, family history of hypertension, and smoking status had significant associations with PIH.

Conclusion: Only 'Beta-hCG levels' were not sufficient as an individual marker for PIH risk. The study suggests that a multifactorial approach, including both biomarkers and clinical factors, may provide accurate assessment for PIH risk. Further research is needed for comprehensive predictive models for PIH screening, particularly in resource-limited settings.

Key Words: Pregnancy-induced hypertension, Beta-hCG, predictive markers, maternal health

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INTRODUCTION

The pregnancy-induced hypertension (PIH) is a health issue affecting pregnant women worldwide, that is 'characterized by elevated BP that arises after 20 weeks of gestation' [1]. Globally, PIH affects about five to tenth percent of pregnancies, and is cause of mother and perinatal morbidity and mortality[2]. This makes women at risk of developing severe complications, preeclampsia and eclampsia, that are associated with adverse outcomes like, preterm birth, low birth weight, and, in severe cases, maternal and fetal death [3]. While developed countries have made significant advances in prenatal care and early detection, leading to lower the incidence and improved measure, but the burden remains increased in 'low-resource setting'. The effect of PIH on maternal and child health is particularly profound in these regions, where limited access to quality healthcare contributes to the persistence of complications.[4.]

In South Asia, including Pakistan, PIH remains a main challenge for maternal health[5]. Researches revealed that the prevalence of hypertensive disorders during pregnancy in Pakistan may be as high as 9-12%, noticeably higher than global averages[6]. This prevalence highlights the need for awareness, screening, and management strategies in the region[7]. Pakistan faces unique challenges in managing PIH due to discrepancies in healthcare access, socioeconomic factors, and differences in healthcare quality across urban and rural areas[8]. In addition, cultural barriers and a lack of awareness among pregnant women exacerbate the risk, often leading to late diagnosis and poor maternal outcomes. Addressing this issue requires a comprehensive approach that includes community-level

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education, improved access to healthcare services, and effective screening practices to detect PIH earlier.

Biomarkers, Beta-hCG 'beta-human chorionic gonadotropin' levels have emerged as possible marker for identifying pregnancies at higher risk of developing hypertensive disorders. Beta-hCG is a hormone produced by the placenta, important for maintaining early pregnancy, and its levels vary significantly throughout gestation. Studies advises that abnormal Beta-hCG 'levels may be associated with an elevated risk of PIH and related complications' as these levels reveal placental health and function[9]. Detecting deviations in Beta-hCG levels could help in early warning, allowing for proactive interventions to prevent the progression of PIH and mitigate its effects on mother and child. 'Although several studies have explored' this association, the predictive accuracy and practical application of the use of 'Beta-hCG' as a marker for predicting the risk of PIH remain under investigation[10].

The aims were to evaluate the relationship of Beta-hCG levels and the incidence of PIH among pregnant women in Pakistan. By examining Beta-hCG levels across different quartiles, this research seeks to identify whether variations in this hormone correlate with increased PIH risk. Findings from this study could contribute to establishing a cost-effective and accessible screening tool for PIH in Pakistan, particularly in resource-limited settings where advanced diagnostic options are scarce. If Beta-hCG levels prove to be a reliable marker for PIH risk, it could help healthcare providers implement preventive strategies earlier, ultimately reducing the 'burden of maternal and neonatal complications associated with hypertensive disorders in pregnancy'.

METHODS

The study design was prospective, observational study conducted at Swat Medical College and Saidu Group of Teaching Hospitals, Swat and aim was to analyze Beta-hCG levels in relation to PIH development with duration of 12 months from June 2022 to June 2023, allowing sufficient time for recruitment, follow-up, and data collection. Total130 pregnant women with purposive sampling method. The participants were equally divided into two groups: 65 women diagnosed with PIH and 65 women without PIH.

Ethical approval of study was obtained from 'Institutional Review Board (IRB)' of the College of Physicians and Surgeons Pakistan (CPSP) with the reference number CPSP/REU/OBG-2018-022-8930, ensuring adherence to ethical standards in all phases of the research. All participants provided written informed consent before enrollment, ensuring they understood the study's purpose, procedures, and any potential risks involved.

The inclusion criteria were: pregnant women during their 2nd trimester, in between 13 and 20 weeks of gestation, which aligns with the standard period for assessing Beta-hCG as a potential biomarker for hypertensive disorders, women aged 18 to 40 years, confirmed singleton pregnancies, and gestational age between 13 and 20 weeks at the time of recruitment. And exclusion criteria included women with pre-existing hypertension, renal or cardiovascular disease, multiple gestations, any known chronic illness that could influence Beta-hCG levels or blood pressure.

The data collection was categorized into two primary phases: baseline assessment and follow-up. At the baseline, demographic and clinical information, age, BMI, smoking status, and family history of hypertension was recorded for each participant. Blood samples were drawn to measure Beta-hCG levels using immunoassay techniques. These samples were processed at the Swat Medical College laboratory under strict protocols to ensure accuracy and reliability of the results.

The participants were then monitored throughout their pregnancies for the development of PIH. BP measurements were taken at each prenatal visit according to the guidelines provided by the American College of Obstetricians and Gynecologists (ACOG). PIH was detected based on a 'systolic diastolic blood pressure' (SBP) of 140 mmHg or above and/or a 'diastolic blood pressure' (DBP) of 90 mmHg or above after the between 13 and 20th weeks of gestation, in the presence of proteinuria or other symptoms indicative of preeclampsia.

The data was analyzed using SPSS 25. Descriptive statistics, including means, standard deviations, and percentages, were calculated for demographic and clinical characteristics. Beta-hCG levels were categorized into quartiles to assess the relationship between different levels and PIH incidence. 'The chi-square tests were used for categorical variables', while independent t-tests were performed to compare mean values of continuous variables between the PIH and non-PIH groups. The logistic regression was performed to evaluate the odds ratios for PIH associated with each quartile of Beta-hCG, adjusting for potential confounding factors, age, BMI, family history of hypertension, and smoking status. ROC curve analysis was conducted to assess the predictive accuracy of Beta-hCG levels for PIH, with the AUC reported. All statistical tests were two-tailed, and a p-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1 shows the average Beta-hCG levels across four quartiles and the corresponding PIH incidence within each quartile. The mean Beta-hCG levels range from 97.78 IU/L in the second quartile to 124.86 IU/L in the third quartile. The highest PIH incidence rates are

found in the first and second quartiles, with 14.6% and 15.4% of cases, respectively. In the third and fourth quartiles, the incidence of PIH is slightly lower, at 10.0% in each.

Table No.1: Beta-hCG Levels and PIH Incidence

Beta-hCG Quartile	Average Beta-hCG (IU/L)	PIH Cases (n)	PIH Percentage (%)
Q1 (Lowest 25%)	101.69	19	14.6%
Q2 (25th - 50th %)	97.78	20	15.4%
Q3 (50th - 75th %)	124.86	13	10.0%
Q4 (Highest 25%)	115.02	13	10.0%

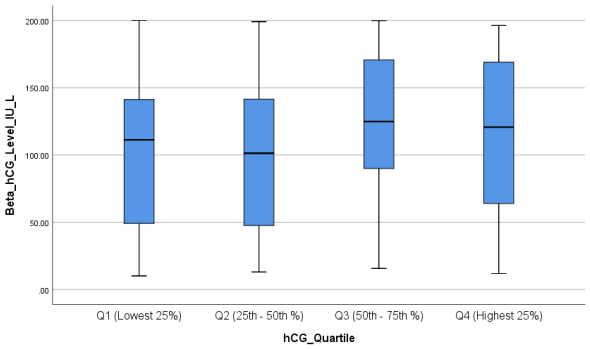

Figure 1: The box plot displays the **distribution of Beta-hCG levels** across four quartiles (Q1 to Q4), representing different percentile ranges. Median Beta-hCG levels are relatively similar across quartiles, with Q3 showing the most variation and Q2 the least. The whiskers illustrate the full range of values, with Q1 having a lower minimum and Q3 and Q4 showing higher maximum values. There are no apparent outliers, indicating a stable range within each group. Overall, the plot suggests minimal variation in Beta-hCG levels across quartiles.

Table 2 compares the demographics and lifestyle factors between groups. The 'PIH group' has a higher mean age of 29.77 years, while 26.83 years in the 'Non-PIH group', with a statistically significant difference (p = 0.008). A significant difference in BMI is also observed, with the 'PIH group' having an average BMI of 31.43 kg/m² versus 21.27 kg/m² in the Non-PIH group (p = 0.001). There is no statistically significant difference in gestational age at sampling between the groups (p = 0.384). For parity, the percentages of nulliparous and multiparous women are similar in both groups, with no significant differences (p = 0.596). However, family history of hypertension and smoking status are notably more common in the PIH group, with 33.1% of PIH cases reporting a family history of hypertension compared to 10.0% 'Non-PIH group', and 14.6% of the 'PIH group identified as smokers compared' to 2.3% in the 'Non-PIH group' (p = 0.001 for both).

Table 2: Demographics and Lifestyle Factors by PIH Status

Variable	PIH Group (n=65)	Non-PIH Group (n=65)	p-value
Age (years)	29.77	26.83	0.008
BMI (kg/m²)	31.43	21.27	0.001
Gestational Age at Sampling (weeks)	16.32	16.69	0.384
Nulliparous %	20.8%	23.1%	0.596
Multiparous %	29.2%	26.9%	0.596
Family History of Hypertension (%)	33.1%	10.0%	0.001
Smoking Status (%)	14.6%	2.3%	0.001

Table 3 provides a comparison of SBP and DB', uric acid levels, and 'proteinuria' between the groups. The PIH group shows significantly higher mean systolic and diastolic blood pressures, at 149.18 mmHg and 99.65 mmHg, respectively, compared to 118.71 mmHg and 77.68 mmHg in the Non-PIH group, with a p-value of 0.001 for both measurements. Uric acid levels are also elevated 'PIH group, with an average' of 7.92 mg/dL while, 4.01 mg/dL in the 'Non-PIH group' (p = 0.001). Proteinuria levels differ between groups as well, with the PIH group showing higher rates of moderate and severe proteinuria, while the Non-PIH group has higher rates of no or trace proteinuria (p = 0.001).

Table 3: Blood Pressure, Uric Acid, and Proteinuria by PIH Status

Measurement	PIH Group (n=65)	Non-PIH Group (n=65)	p-value
Systolic BP (mmHg)	149.18	118.71	0.001
Diastolic BP (mmHg)	99.65	77.68	0.001
Uric Acid (mg/dL)	7.92	4.01	0.001
Proteinuria Level			0.001
- Mild (%)	11.5%	12.3%	
- Moderate (%)	15.4%	0.0%	
- None (%)	0.0%	17.7%	
- Severe (%)	23.1%	0.0%	
- Trace (%)	0.0%	20.0%	

Table 4 summarizes gestational outcomes and maternal weight gain by PIH status. The preterm birth rate is 18.5% in the PIH group and 12.3% in the Non-PIH group, though this difference is not statistically significant (p = 0.128). APGAR scores at 1 minute and

5 minutes are significantly lower in the PIH group, with mean scores of 4.98 and 6.51, respectively, compared to 7.94 and 8.57 in the 'Non-PIH group' (p = 0.001 for both). Additionally, the PIH group has a lower average maternal weight gain of 7.42 kg, compared to 15.09 kg in the Non-PIH group, with a p-value of 0.001.

Table No.4: Gestational Outcomes and Maternal Weight Gain by PIH Status

Outcome	PIH Group (n=65)	Non-PIH Group (n=65)	p-value
Preterm Birth (%)	18.5%	12.3%	0.128
APGAR Score (1 min)	4.98	7.94	0.001
APGAR Score (5 min)	6.51	8.57	0.001
Maternal Weight Gain (kg)	7.42	15.09	0.001

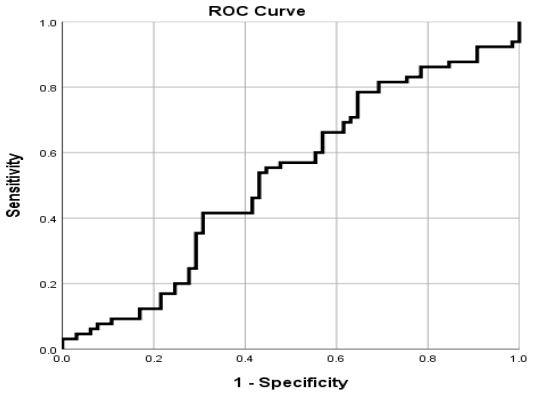

Figure No.2: The ROC curve shows the diagnostic performance of Beta-hCG levels for predicting PIH. The curve's proximity to the diagonal line (45-degree line) indicates limited predictive ability, with an area under the curve (AUC) of 0.524, suggesting minimal discrimination between cases with and without PIH. Sensitivity and specificity do not consistently improve, indicating that Beta-hCG levels are not a strong predictor of PIH in our study.

Table 5 presents a predictive analysis for PIH, including odds ratios and ROC analysis. The odds ratio for family history of hypertension (No vs. Yes) is 0.128, with a 95% confidence interval of 0.058 to 0.283, indicating a strong association with PIH. The ROC analysis for Beta-hCG levels yields AUC of 0.524, 'with a 95% confidence interval of' 0.507 to 0.541, suggesting limited predictive value for PIH. Adjusted odds ratios 'for family history of hypertension and smoking status' were 52.481 and 6.110, respectively, though the confidence intervals are extremely wide due to convergence issues in the logistic regression model.

Table No.5: Predictive Analysis for PIH

Analysis	Value	95% CI
Odds Ratio for Family History of Hypertension (No vs. Yes)	0.128	0.058 - 0.283
ROC (AUC) for Beta-hCG Levels	0.524	0.507 - 0.541
Adjusted Odds Ratio for Family History of Hypertension	52.481	(-14645.37, 14750.33)
Adjusted Odds Ratio for Smoking Status	6.110	(-9310.58, 9322.80)

DISCUSSION

This study examined the a'ssociation between Beta-hCG levels in mid-trimester and the risk of developing PIH' among pregnant women. Our findings showed no substantial difference in PIH incidence across Beta-hCG quartiles, suggesting that Beta-hCG levels in the second trimester may have limited predictive value for PIH. This aligns with some previous studies, while other research has shown conflicting results, emphasizing the complexity of predicting hypertensive disorders in pregnancy.

Previous studies have explored the Beta-hCG as a possible biomarker for hypertensive disorders during pregnancy, with mixed outcomes[11]. Research by Murmu et al. (2020) observed elevated Beta-hCG levels in women who later developed preeclampsia, suggesting a potential link between early placental dysfunction and hypertensive outcomes[10]. However, the predictive value was moderate, and Beta-hCG alone was not sufficient for reliable risk stratification. Similarly, a study by Chen et al. (2020) highlighted that while higher Beta-hCG levels were more common in pregnancies complicated by hypertensive disorders, this marker alone lacked specificity and was often inconsistent when evaluated independently of other clinical factors[12]. These findings resonate with our results, where Beta-hCG levels showed limited association with PIH, suggesting that this hormone may not act as a standalone predictor.

In contrast, some studies have shown a more considerable 'association between elevated Beta-hCG levels and PIH', especially in cases of severe preeclampsia[13]. Huma et al. (2022) reported that women with high Beta-hCG levels in early pregnancy had a higher risk of developing preeclampsia, supporting the hypothesis that elevated hormone levels may reflect placental stress or dysfunction[14]. However, our study did not observe a similar pattern, 'which could be attributed to differences in study design, sample size, and the population' under investigation.

Notably, our study was conducted in Pakistan, where genetic, environmental, and lifestyle factors may influence the incidence and expression of hypertensive disorders differently compared to other regions.

In addition to Beta-hCG, other biomarkers have been proposed as potential predictors of PIH, placental growth factor (PlGF) and soluble fms-like tyrosine kinase-1 (sFlt-1), which reflect placental health and vascular adaptation. Studies including these biomarkers with Beta-hCG have shown improved predictive accuracy for hypertensive disorders, as they detect different aspects of placental function[15]. A study by Liu et al. (2021) report that combining Beta-hCG with PlGF considerably enhanced the detection rate for early-onset of preeclampsia[16]. This approach suggests that PIH may be best predicted by combination of biomarkers rather than depending on Beta-hCG only, emphasizing the need for integrated screening strategies.

Additionally, another important concern was the role of demographic and lifestyle factors in PIH risk. Our study revealed that age, BMI, smoking status, and family history of hypertension were significantly associated with PIH, that were in accordance with established risk factors reported in previous literature. A study by Wagata et al. (2020), Schenkelaars et al. (2021) and Zahra et al (2024) highlighted the impact of maternal age and obesity on hypertensive disorders, supporting the idea that demographic and clinical factors should be considered when determining risk of PIH[17-18]. 'These variables may interact with Beta-hCG levels, influencing the development of PIH in complex ways that single biomarker analysis cannot'.

Additionally, in terms of clinical implications, our study showed that Beta-hCG may not be sufficient as a only screening tool for PIH in the general population. The limited predictive accuracy of Beta-hCG, as observed in our study, highlight the need for a wider approach that associations biomarkers with demographic and clinical data. This approach could improve early detection and allow for targeted interventions in high-risk groups, eventually improving maternal and neonatal outcomes. Furthermore, this study highlights the importance of contextual factors, as the predictive value of Beta-hCG may differ by population, underlining the need for localized research that considers regional health profiles.

While Beta-hCG offers some insights into placental function, its efficacy in predicting PIH remains limited. The findings our study add to the growing body of literature suggesting that a sole biomarker approach may not be adequate for detecting PIH risk. Future research should focus on multi-biomarker models and consider adding demographic and lifestyle factors to improve screening accuracy. Moreover, large size studies in diverse populations are necessary to validate these findings and develop tailored screening strategies that support with the specific needs of different regions and healthcare settings.

CONCLUSION

The study observed the relationship between mid-trimester Beta-hCG levels and the development of PIH of pregnant women. Our findings showed that Beta-hCG levels alone may not serve as a reliable predictor of PIH, as no significant associations were found across different quartiles of the hormone.

The detected lack of strong correlation suggests that PIH risk assessment should consider a combination of biomarkers with demographic and lifestyle factors, age, BMI, family history of hypertension, and smoking status, that had significant associations with PIH in our study. By incorporating these varaibles, healthcare providers may achieve a more comprehensive approach to early PIH detection and management.

Author's Contribution:

Concept & Design of Study:	Hafiza Nida Mumtaz
Drafting:	Saima Ahmed, Asma Hameed
Data Analysis:	Sadaf Ali, Kiran Kalsoom
Revisiting Critically:	Hafiza Nida Mumtaz, Saima Ahmed
Final Approval of version:	By all above authors

Conflict of Interest: The study has no conflict of interest to declare by any author.

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Original Article

Role of Balloon Temponade in Controlling Postpartum Hemorrhage (PPH)

Bakth Ranra, Humeera Naz, Zul-e-Huma, Aneesa Sadiq, Parveen Shafi and Maida Khan

ABSTRACT

Objective: To evaluate the efficacy of balloon tamponade in controlling PPH.
Study Design: Descriptive cross sectional study
Place and Duration of Study: This study was conducted at the Department of Obstetrics and Gynecology, GKMC Swabi from January 2023 to June 2023.
Methods: A total of 134 patients were included in the study. Information regarding age, gestational age, mode of delivery, assessment of effective bleeding was recorded. Effectiveness was measured if the bleeding stops within 15 minutes of applying tamponade, and if no bleeding occurred within 24 hours and after removing of balloon tamponade. Blood loss estimation sanitary pad was weighed beforehand and after being soaked in blood was weighed again and difference was noted, 1 gm was taken as 1ml. All the data was analyzed by using SPSS.
Results: This study was conducted on 134 patients. The Mean and SD for age was 26.69±4.21. Mean and SD for gestational week was 38.51±1.102. Mean and SD for parity was 2.04±2.11. Mean and SD for blood loss in mL was 896.34±186.72. The mode of delivery in 126 (94%) patients was spontaneous and in 8 (6%) patients it was instrumental. Balloon tamponade was found effective in 127 (94.8%) patients and was not found effective in 7 (5.2%) patients.
Conclusion: We conclude that the use of condom balloon tamponade can effectively help in reducing blood loss and both maternal morbidity and mortality associated with PPH.
Key Words: Postpartum hemorrhage (PPH), Normal vaginal delivery, Condom Balloon Tamponade.

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INTRODUCTION

Obstetric hemorrhage is one of the major cause of maternal deaths worldwide and major type of obstetric hemorrhage is Postpartum hemorrhage. Postpartum hemorrhage (PPH) is defined as bleeding of more than 500ml after normal vaginal delivery. It can also be defined as a blood loss of 1000ml after caesarean section (CS) from the birth canal OR any amount of blood loss from birth canal which leads to 10 % drop in hematocrit or which makes a patient hemodynamically unstable and necessitates blood transfusion[1-2].

Deaths due to pregnancy are a leading cause of premature death worldwide.

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According to WHO report, 127000 deaths occur annually worldwide mainly due to obstetric hemorrhage[1].Post- partum hemorrhage is an equal opportunistic killer. Despite appropriate management, 3% of vaginal deliveries end up with life threatening postpartum hemorrhage[3]. Postpartum hemorrhage (PPH) complicates up to 18% of all deliveries and accounts for 25-30% of all maternal deaths worldwide[2]. The prevalence of PPH in Pakistan is 34%[4].

Pathogenesis of PPH involves abnormality in any one among the four processes (tone, tissue, trauma, thrombin) or combination of these[3]. Among these processes uterine atony is on the top, accounts for almost 80% cases of PPH[3,5]. Other causes of primary PPH include trauma of lower genital tract, retained placental tissues, inversion of uterus, uterine rupture and consumptive coagulopathy. Common complications of PPH include hypovolumic shock, renal and hepatic failure, adult respiratory syndrome (ARDS) disseminated intravascular coagulopathy (DIC) which end up with maternal death[6].

PPH Management requires a stepwise management that includes the ruling out of genital tract trauma and retained products of conception. Uterine atony management includes uterine massage, bimanual uterus compression and by use of various utero tonic medication such as oxytocin, misoprostol, argometrine

and prostaglandin F2 alpha[6,7].

When medical treatment fails surgical intervention will be required in the form of uterine compression sutures, uterine and internal iliac artery ligation, and possible hysterectomy. As hysterectomy is as a life-saving procedure, but it leads to lifelong morbidity in form of permanent infertility, and psychosocial complications[8]

Recently uterine tamponade has been introduced and should be used as 2nd line in case of failure of medical treatment before going to surgical intervention. Previously tamponade was done by uterine packing[9] but due to complications like risk of perforation and infection[5], it has been replaced by uterine balloon tamponade[3]. Use of many type of balloon devices has been reported, that includes Bakri balloon, Sagstaken-Blakemore tube, Rusch balloon, Condom catheters and Foley catheters[10,11]. This balloon acts by exerting an internal pressure higher than the systemic arterial pressure, which compresses the arteries and consequently, stops the bleeding. As it is logically the least invasive procedure, it would be utilized before arranged for surgery and probable hysterectomy[3]. laparotomy can be avoided by this procedure, minimal anesthesia required for its insertion, painless removal, and procedural failure can be identified quickly and easily. Due to simplicity of the procedure it can be implemented by primary health worker before referral to tertiary care center which will reduce loss of blood and will prevent mortality and irreversible shock [12,13]. The purpose of this study was to assess the efficacy of condom balloon tamponade in controlling PPH.

METHODS

This study was conducted in the Obstetrics and Gynecology department, GKMC Swabi.

Study duration:

Six months from the date of approval of synopsis.
January 2023 to June 2023.

Sample size:

Sample size will be of 134 cases calculated by open EPI software by taking 95% confidence level, 5 % margin of error and expected percentage of efficacy with balloon tamponade as 90.4%.

Sampling technique:

Non Probability consecutive sampling technique.

Inclusion Criteria: Patient with age group 18-35 years with history of gestational age > 37 weeks presented with primary PPH due to uterine atony (will be assess by per abdomen examination of uterus) and normal vaginal delivery after failing medical treatment.

Exclusion Criteria: All females presented with PPH due to retained product of conception, cervical vaginal tears, perineal tears or coagulation disorder.

Females with history of previous caesarian section
Secondary PPH

Data collection procedure: A total of 134 patients who were admitted through emergency with PPH or those patients who developed PPH after delivery in the labour room in whom medical treatment fails and fulfilling the inclusion criteria were included in the study. After approval of ethical committee of GKMC and CPSP, taking an informed consent, patient were put in lithotomy position and condom fitted with rubber catheter was inserted into uterus with help of sponge holding forceps and condom balloon will be inflated with 250-500 ml saline until resistance is felt or bleeding stopped.

Compression vaginal packing was done by gauze piece to keep catheter in position. If bleeding stopped within 15 mints of applying tamponade. Syntocinon 40 units in form of infusion was given for 4 hour during and after procedure. Patient was catheterized and kept in observation for 24 hours in ward. Vitals and input output record were monitored in ward for 24 hours.

Antibiotics were prescribed prophylactically for 7 days and aseptic techniques were ensured. After 24 hours if patient was hemodynamically stable and no further bleeding was observed the balloon was deflated gradually in presence of senior gynecologist having a minimum of 5 years' experience. Information regarding age, gestational age, mode of delivery, assessment of effective bleeding was recorded. Effectiveness was measured if the bleeding stopped within 15 minutes of applying tamponade, and if no bleeding occurred within 24 hours and after removing of balloon tamponade. Blood loss estimation sanitary pad was weighed before hand and after being soaked in blood was weighed again and difference was noted, 1 gm was taken as 1ml.

Data analysis:

All Data was entered and analyzed through SPSS version 20. Numerical variables such as patient age, parity, gestational age, loss of blood, blood pressure and Pulse rate were calculated as Mean and SD. Nominal variables like efficacy, mode of delivery, booking status was presented as frequency and percentages.

RESULTS

This study was conducted on 134 patients. The Mean and SD for age was 26.69±4.21. Mean and SD for gestational week was 38.51±1.102. Mean and SD for parity was 2.04±2.11. Mean and SD for blood loss in mL was 896.34±186.72. Mean and SD for systolic BP was 81.65±6.306. Mean diastolic BP was 49.81±6 and Mean and SD for pulse rate was 100.36±5.1 (Table 1). In the age group of 18 to 26 years there were 73 (54.5%) patients and 61 (45.5%) were in the age group of 26 to 35 (Figure 1). According to gestational age wise distribution, 73 (54.5%) patients were in the gestational age group of 37 to 38 weeks and 61 (45.5%) patients were in the gestational age group of 39 to 40 weeks (Table 2). According to parity wise distribution

there were 111 (82.8%) patients in the parity group of 1 to 3 and 23 (17.2%) patients in the parity group of 4 to 5 (Table 3). The mode of delivery in 126 (94%) patients was spontaneous and in 8 (6%) patients it was instrumental (Table 4). According to the booking status, 11 (8.2%) patients were booked and 123 (91.8%) patients were not booked (Table 5). Balloon tamponade was found effective in 127 (94.8%) patients and was not found effective in 7 (5.2%) patients (figure 2).

Table No. 1: Descriptive statistics:

Numerical Variables	Minimum	Maximum	Mean	Std. Deviation
Patient's age in years	18	35	26.69	4.210
Gestational age in weeks	37	40	38.51	1.102
Parity	1	5	2.04	1.110
Blood loss in ml	558	1194	896.34	186.726
Systolic BP mmHg	70	90	81.65	6.306
Diastolic BP mmHg	40	60	49.81	6.001
Pulse rate	91	108	100.36	5.192

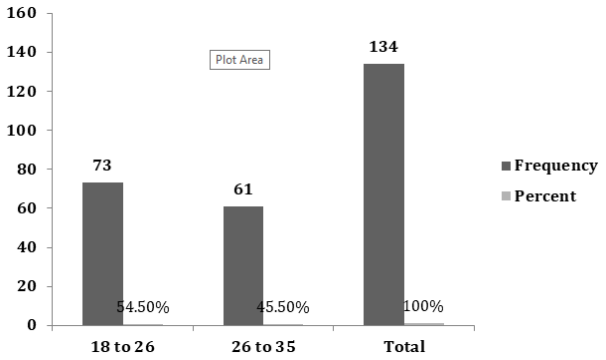

Figure No. 1: Age wise distribution of patients

Table No. 2: Gestational age wise distribution

Gestational age groups	Frequency	Percent
37 to 38	73	54.5%
39 to 40	61	45.5%
Total	134	100%

Table No. 3: Parity group wise distribution (n=134)

Parity groups	Frequency	Percent
1 to 3	111	82.8%
4 to 5	23	17.2%
Total	134	100%

Table No. 4: Frequencies and percentages of mode of delivery

Mode of delivery	Frequency	Percent
Spontaneous	126	94%
Instrumental	8	6%
Total	134	100%

Table No. 5: Frequencies and percentages of booking status

Booking status	Frequency	Percent
Yes	11	8.2%
No	123	91.8%
Total	134	100%

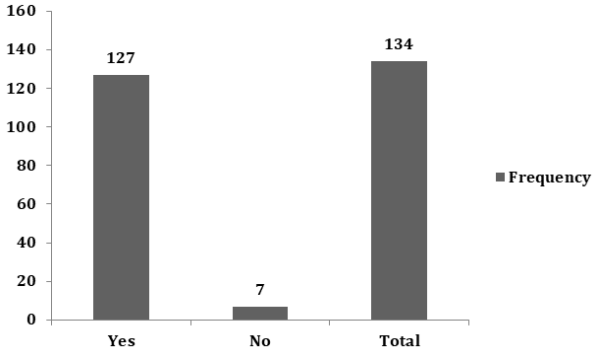

Figure No. 2: Frequencies and percentages of efficacy of balloon tamponade

DISCUSSION

One of the most common issues obstetricians encounter globally is PPH. In PPH, there is a limited period of opportunity to save lives, hence preventive measures are crucial. Approximately 60% people who use prophylactic uterotonics develop PPH[14]. Patients with uncontrollable bleeding might swiftly experience hemodynamic instability and a cascade of problems that can result in the patient's death. Hemostasis after these surgical procedures should begin as soon as possible. Although successfully attempted, alternatives like ligating the uterine or internal iliac arteries entail complicated pelvic dissection and might not always be feasible. Embolization is not an option available in remote hospitals since it needs a multidisciplinary strategy and expensive setup. Historically, hysterectomy was the only option left for treatment, but pressure to preserve fertility and avoid hysterectomy has spurred the development of a number of procedures recently[15]. Another promising approach for controlling PPH is the B-Lynch procedure, which is nonetheless invasive. The balloon tamponade is a more straightforward and practical alternative for halting the bleeding. It is a widely accepted treatment for individuals who have uncontrollable PPH, particularly when the condition is

brought on by atony, coagulopathy, and placenta accreta. The majority of patients with intractable PPH respond positively to tamponade using a variety of balloon devices, including the Sengstaken-Blakemore tube[16], the Foley catheter, the less costly "Bakri tube,"[17], and condom catheter. They are employed to stop PPH by compressing the uterine sinuses. In the past, tamponade was attempted by filling the uterine chamber with ribbon gauze. In order to prevent bleeding from continuing above the packing, a 20-meter ribbon is securely put within the uterus beginning at the fundus. But because of concerns over on-going hidden bleeding and infection of uterine cavity, this came into contempt. Sengstaken-Blakemore tubes and Foley catheters are two further types of tamponade that have been utilized successfully. These are costly, complicated, and sometimes inaccessible. Contrarily, a condom catheter is a straightforward, affordable, and unquestionably effective substitute. It naturally conforms to the shape of the uterine cavity, requires no complicated packing, and is simple to remove. Since it does not involve any direct intrauterine manipulation and does not require for a high level of surgical skill, it carries no risk of infection.

In our study balloon tamponade was effective in 94.8% cases, which is comparable with various studies. A study conducted in Srinagar, Kashmir[18] showed the efficacy of balloon tamponade was 96%. Another study conducted in Pakistan [11] showed that balloon tamponade was effective in 90.4% cases. A similar study conducted in India[19] showed that in 94.44% cases postpartum bleeding was stopped within 10 minutes of creating balloon tamponade.

In our study the mean age of the patients was 26.69±4.21, 126 (94%) patients had spontaneous delivery while 8 (6%) patients had instrumental delivery. 11 (8.2%) patients had been booked and 123 (91.8%) had been un-booked. Our results are comparable with a Pakistani [11] study which showed a mean age of 26.4±4.2, 90.4% patients had spontaneous vaginal delivery while 9.6% patients had instrumental delivery. The booked cases were 28.8% while un-booked were 57.7%. Our results have shown statistical significance between efficacy of balloon tamponade and mode delivery (p=0.01), efficacy of balloon tamponade and booking status (p=0.04) and efficacy of balloon tamponade and parity (p=0.0001).

Condom tamponade is a low-cost and easily available method. It is an easy to use techniqueand can be practiced by trained birth professionals in developing countries while arrangements for hospital transportations are made especially in rural areas. The bleeding is stopped as a result of the inflated condom's natural adjustment to the shape of the uterine cavity and its ability to keep uniform pressure on the sinuses. It is inflated for 250–300 ml, which is often enough, till the bleeding is under control. The saline first runs freely before slowing down. This is consistent with a decrease in bleeding.

CONCLUSION

From the present study we conclude that balloon tamponade is a low budget, simple and easily available but still effective alternative for managing a serious life threatening complication like PPH. PPH is frequently encountered in under developed and developing countries where deficient resources create hurdles for ideal care delivery for common patients at local level especially in peripheral medical setups. Use of condom tamponadecan effectively help in reducing blood loss and both maternal morbidity and mortality associated with PPH.

Author's Contribution:

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Final Approval of version:	By all above authors

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Original Article

Association of Obstetric Risk Factors with Postpartum Urine Retention after Vaginal Delivery

Amina Hanif, Memoona Hanif, Tahira Akhtar, Ayesha Arshad, Amina Waheed and Saher Arshad

ABSTRACT

Objective: The basic aim of the study is to find the association of obstetric risk factors with postpartum urine retention after vaginal delivery.

Study Design: Case-control study

Place and Duration of Study: This study was conducted at the Gujranwala Medical College Teaching Hospital in Gujranwala from March–June 2024.

Methods: Our research included 300 females who had undergone vaginal delivery. Thirty-four of the women (11.3%) experienced postpartum urinary retention, while 266 (88.6%) did not. The rest of the women served as controls. Suppose a woman is unable to urinate within eight hours of giving birth and has a significant postpartum residual volume (PMRV) or a postvoid residual bladder volume of at least one hundred milliliters (mL). In that case, she is said to have postpartum urinary retention (PPUR). Through the use of logistic regression, risk factors were defined.

Results: The tendency to retain urine after giving birth was strongly linked to several factors, such as labor that lasted longer than six hours (Odds ratio = 0.46, 95% Confidence interval for OR = 0.06-3.67, p<0.001), perineal injuries (Odds ratio = 97.09, 95% Confidence interval for OR = 7.93-1188.93, p<0.001), an episiotomy (Odds ratio = 0.07, 95% Confidence interval for OR = 0.01-0.68, p = 0.022), and a baby that weighed more than 4 kg (Odds ratio = 0.04, 95% Confidence interval for OR = 0.01-0.20, p<0.001).

Conclusion: Postpartum urine retention is a quite prevalent issue following vaginal delivery. Preventing this problem requires understanding the related risk factors, which include protracted labour, perineal lacerations, episiotomy, and macrosomic birth.

Key Words: Bladder, risk factors, urinary retention, delivery, postpartum

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INTRODUCTION

Despite being common after both vaginal and caesarean births, postpartum urinary retention (PUR) is still an issue that needs more attention[1] The urine accumulation in the bladder of postpartum woman for a period of 6 hours following childbirth is referred to as postpartum urinary retention (PUR). This condition is marked by either the inability to remove the urine on one's own or the incapability to completely eliminate it.[2]

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The condition postpartum urinary retention (PPUR) is more likely to occur in women who have undergone intraspinal anaesthesia during the delivery of their babies. If it is not recognised and treated on time, it can give rise to long-term urinary dysfunction.[3] PUR takes place after 0.05%–45% of deliveries.[4] It is very important to get a correct diagnosis and start treatment right away to avoid problems like bladder injury, detrusor muscle and nerve damage, and kidney failure.[5]

One of the most prevalent complications that may arise following childbirth is postpartum urinary retention (PPUR), which can be classified into two categories: overt and covert. During the first six hours after a vaginal delivery, the inability to urinate on one's own is the defining characteristic of overt postpartum urine retention, (PUR). On the other hand, covert PUR is characterised by spontaneous urination within six hours of delivery, but urine volume that remains in urinary bladder after the initial urination is equal to or greater than 150 millilitres. Different elements are responsible for the aetiology. Owing to the physiological changes that take place during pregnancy, a greater post-void

residual volume is observed in the bladder, which also becomes hypotonic. Urinary retention can be the result of a perineal neuropathy that develops during the delivery process.[6]

There is a lack of understanding regarding the illness known as PUR, which is supposed to be caused by a number of different variables. Anatomical changes that are generated by delivery, such as the loss of awareness of the bladder filling, the inhibition of micturition, the descent of the bladder with pushing, and hormonal changes that occur in the bladder throughout pregnancy, have been postulated as potential causes of postpartum urinary retention (PUR) by a number of studies.[7] Numerous factors have been associated with the neurological, physiological, and mechanical processes that arise during pregnancy and vaginal delivery. There is evidence that one of these features, painless delivery, influences the result on its own.[8] Periurethral blocking edema may be the result of trauma to the pelvic floor muscles, the detrusor muscle, and overdistention of nerve fibers, and bladder function may also be impacted by hormonal fluctuations. Bladder sensitivity may be compromised. Failure to promptly identify PPUR can result in detrusor muscles atony, denervation, and failure of urinary bladder.[9] Treatment of persistent urine retention is necessary in order to avoid micturition issues brought on by hydronephrosis, anuria, detrusor failure and kidney failure. This condition has the potential to be life-threatening for the patient and necessitates therapy.[4]

Postpartum urinary retention (PUR) is more likely to happen if the second stage of labor lasts longer than expected, if you had an instrumental or vacuum-assisted delivery, if you had a perineal laceration, an episiotomy, epidural analgesia, or intermittent catheterization during labor, or if you don't go to the bathroom on your own soon after leaving the delivery room.[9] During the past several years, China has made significant strides in the implementation of labour analgesia techniques and concepts. As a result, labour epidural analgesia has been done extensively at a variety of midwifery institutes around the country. There has been a gradual increase in the rate of labour epidural analgesia, which has increased the incidence of postpartum urinary retention (PPUR), which has become more widespread and complicated. Epidural anesthesia may increase the chance of overt PUR, according to studies.[10]

Women who are in the immediate postpartum period frequently experience urinary retention, which can be a very irritating problem. The main short-term consequence is persistent urinary retention, which can be managed with clean intermittent self-catheterization. As part of the treatment, supporting measures are implemented to increase the possibility of micturition. These interventions include ambulation, privacy, and taking a warm bath. To prevent the need for prolonged or recurrent catheterization, prophylactic antibiotics may be recommended in the event that the bladder holds more than 700 millilitres of urine.[6] In spite of the fact that catheterization is utilized in the treatment of PUR, there is no method or clinical guideline that has been developed regarding the type of catheterization or the duration of time that it should be carried out. While some groups employed a combination of continuous catheterization (CC) and intermittent catheterization (IC), others reported using an indwelling catheter for a period of twenty-four to seventy-two hours.[11].

METHODS

March–June 2024 was the time frame for this case-control study at the Gujranwala Medical College Teaching Hospital in Gujranwala. With informed consent from all participants, the study included 300 consecutive women who gave birth to term singletons vaginally following uncomplicated pregnancies; the study was authorised by the institutional review board.

To determine the postvoid residual bladder volume (PVRBV), a transabdominal ultrasound was performed on each woman after giving birth. To get scans of the bladder both laterally and longitudinally, the transducer was placed over the symphysis pubis. PVRBV was determined by multiplying the widths of the transverse and longitudinal scans by 0.7, with D1 representing the broadest diameter, D2 the anteroposterior diameter, and D3 the cephalocaudal diameter.

The women who were classified as cases were those who had an estimated PVRBV of 100 milliliters or more, or who were unable to urinate with significant PMRV within eight hours after delivery. Those individuals who had an estimated PVRBV of less than 100 mL were designated as controls.

Each and every participant had a wide variety of maternal and neonatal demographic data taken from them simultaneously. Parity, BMI, age, birth weight, newborn head circumference, gestational age at labor start, analgesia, oxytocin use, labor duration, fundal pressure, macrosomic delivery, perineal lacerations, episiotomy, and postpartum urinary pain were collected.

Our statistical analysis was conducted using version 15.0 of SPSS. By using the Kolmogorov-Smirnov test, the normal distribution was evaluated. Mean ± standard deviation is used to represent variables having a normal distribution, and median values are used to represent those without. The Mann-Whitney U test, the chi-square test, and the independent sample t-test were employed wherever it seemed suitable to do so in order to establish statistical comparisons. These tests were utilized for the aim of establishing statistical patterns. In order to analyze the risk factors associated with PPUR, logistic regression was employed. A p-value of less than 0.05 was considered statistically significant.

RESULTS

34 out of the 300 women enrolled in the research had PPUR, resulting in an incidence rate of 11.3%. Within this group, 28 individuals (9.33%) exhibited covert retention, while 6 individuals (2%) displayed overt retention.

Mother age, gravidity, parity, BMI, duration from birth to first void, gestational period, postpartum urine signs, and neonate head circumference did not exhibit any significant differences between cases and controls. In comparison to controls, cases had a significantly higher mean birth weight (3745.79±432.18 g vs. 3493.63±492.68 g, p<0.032). A significantly higher mean PVRBV was observed in cases (202.11±60.15 mL vs. 57.84±26.63 mL, p<0.001).

Patients and controls exhibited similar obstetric characteristics in the first and third periods. Patients experienced a substantially longer 2nd stage of labor than controls (38.42±9.44 minutes vs. 23.00±11.72 minutes, p<0.001). The number of cases that had fundal pressure, macrosomic infants, episiotomy, and perineal laceration was significantly greater than the average. According to logistic regression analysis, PPUR was not associated with parity, analgesic use during labor, first-stage labor length, oxytocin labor induction, fundal pressure, or birth-to-first-void time. Postpartum ureteral retention (PPUR) was had a number of risk factors, including episiotomy (odds ratio = 0.07, 95% confidence interval = 0.06–0.68, p = 0.022), prolonged second-stage labour (odds ratio = 0.46, 95% confidence interval = 0.06–0.67, p < 0.001), perineal lacerations (odds ratio = 97.09, 95% confidence interval = 7.93-1188.93, p < 0.001), and a newborn birth weight that was greater than 4000 grams (odds ratio = 0.04, 95% CI for OR = 0.01-0.20, p < 0.001).

Table No. 1: Evaluation of PUR risk factors using logistic regression analysis

	Odds Ratio (OR)	95% CI for OR	P value
Second stage duration	0.46	0.06-3.67	< 0.001
Perineal lacerations	97.09	7.93-1188.93	< 0.001
Fetal macrosomia	0.04	0.01-0.20	< 0.001
Episiotomy	0.07	0.01-0.68	0.022

To be statistically significant, a p-value of less than 0.05 was evaluated.

DISCUSSION

Our investigations show that 11.3% of women experience postpartum urine retention following a vaginal delivery. While the incidence of postpartum urinary retention varies widely in the literature, many cases go undetected, particularly covert cases identified only through ultrasound or catheterization. For example, according to a research conducted by Polat et al,[12] the incidence rate of about 22.1% which is roughly thr double of our results.

The specific cause of PPUR is still unknown, despite the fact that several obstetric risk factors have been proposed as potential causes. The risk factors for postpartum urine retention (PUR) identified in our study include episiotomy, prolonged second-stage labor, perineal lacerations, and fetal macrosomia. The results of our study are backed up by another study Cavkaytar S et al[13]. That study identified episiotomy, perineal laceration, and protracted second stage of labor as the primary risk factors for postpartum urine retention (PUR).

Primiparity has been recognized as a risk factor in a number of studies; however, our research did not provide evidence to support this hypothesis. None of our subjects received regional anesthesia or instrumental delivery, which have been linked to PPUR risk. On the other hand, fundal pressure during labour, which was shown to be more prevalent among patients, was not found to be a critical element in our regression model. We found that prolonged second-stage labour and macrosomic newborns enhanced the incidence of PPUR due to pelvic floor mechanical stress and abdominal strain. Pain and reflex urethral spasm may have increased the risk of PPUR after perineal lacerations and episiotomy.

CONCLUSION

A woman's immediate and long-term well-being can be significantly impacted by postpartum urinary retention (PUR), a significant yet frequently overlooked complication. The condition is quite prevalent, and if it is not controlled properly, it can have severe repercussions. To avoid this problem, it's important to think about factors like episiotomy, perineal lacerations, prolonged labour, and the delivery of a macrosomic newborn. Additional research is required to investigate the effectiveness of postpartum bladder scanning as well as factors leading to postpartum urinary retention (PPUR).

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Final Approval of version:	By all above authors

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Original Article

An Age Based Differential Response of Dry Eye Disease on Topical Lubrication

Asif Mashood Qazi, Shahid Hussain Shah, Muhammad Moeez Uddin, Fayaz Ahmed and Abdul Sattar

ABSTRACT

Objective: To compare the OSDI (Ocular Surface Disease Index), SIT (Schirmer I Test), FBUT (Fluorescein Break Up Time), and FLCS (Fluorescence Staining) scores of dry eye patients at various ages.

Study Design: A randomized controlled trial study

Place and Duration of Study: This study was conducted at the Al Ibrahim Eye Hospital Karachi from February 2023 to January 2024.

Methods: 90 eyes from 90 patients with mild to moderate dry eye were incorporated & split into three groups: young (20-39 years, n = 29), middle-aged (40-59 years, n = 30), and elderly (> 60 years, n = 31). Patients received a 28-day course of topical medications that lubricated the ocular surface and encouraged repair. At 7, 14, and 28 days, patients were checked in. Examinations were done on the OSDI, SIT, FBUT, and FLCS scores.

Results: The OSDI scores in three groups varied at each time point (all P 0.001); however, no group's score varied across time points. A time effect was discovered (F = 80.87, P 0.001), and SIT were different between the three groups (F = 350.61, P 0.001). Middle-aged and elderly groups had lower SIT at 14 and 28 days' post-treatment than young group (all P 0.001). SIT was lower in the elder group at 7, 14, and 28 days (all P 0.001). For all time points, the FLCS score was lower at 28 days (P 0.001).

Conclusion: Patients with dry eyes are prescribed a 28-day course of topical medications that lubricate the ocular surface and promote corneal repair. These medications have been shown to increase tear production, film stability, and corneal integrity. Age has an impact on how mild to moderate dry eye is treated, with tear secretion being the most crucial component.

Key Words: Age, dry eye Index of ocular surface illness, Schirmer I examination, Breakup time of fluorescein, Corneal fluorescence darkening index

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INTRODUCTION

Today, dry eye is understood to be an ocular surface disease characterized by tear film homeostasis loss, ocular symptoms, tear film instability and hyperosmolarity, inflammation, and ocular surface damage[1]. To maintain a normal ocular surface, tear film is kept normal by a well regulated ocular surface tissue components Importantly, the ocular surface restored to normal and intact condition in response to well regulated components of the tear film. Whenever the chain breaks it disrupts the structure and possibly the function of the tear film from which it originated, resulting in asymptomatic dry eye[2, 3].

Some of these methods include; The Schirmer I test (SIT), Ocular Surface Disease Index (OSDI) score, Fluorescein break up time (FBUT), and the corneal fluoroscein staining (FLCS) score[2,4]. It is widely expected that with growing numbers of people aging, the number of patients with dry eye, an age-related degenerative disease, will also rise in global public health[5-7]. But, further studies should be conducted in order to estimate, if there are differences between the indicators and symptoms of individuals with dry eye in age-related groups before and after therapies[8]. DESpite the semi-rigorous nature which authors claim may contribute to the variability of results, paradoxically there is a call for systematic stratified studies, the DEWS II Epidemiological Report indicates the discrepancies between male and female in connection with the indications of dry eye with age.

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METHODS

A randomized controlled trial was conducted at Al Ibrahim Eye Hospital Karachi included 90 eyes from 90 people who had mild to moderate dry eye who attended our outpatient clinic between February 2023 to January 2024. All patients were examined for other ocular surface diseases by slit lamp examination and fundus diseases by fundus examination.

In order to qualify, patients had to meet the following criteria: First, the patients reported episodes of dry eye, which could manifest as grittiness or foreign body sensation Second, the patients did not receive any other dry eye therapy in the previous month Third, the patients ranged between the ages 18 and 78 and excluded patients who have some mental and psychological disorders. Patients with other ophthalmic diseases who need to use local ones or systemic other medicines that may infiltrated tear secretion were excluded; [3] those with eyelid metabolism disorders and conjunctival sac relaxation, ectropion, or blepharospasm; [4] those who are pregnant or nursing, or who are taking hormones;[6] those with syndrome Sjögren or Stevens-Johnson syndrome, abnormal thyroid function,

If the patients had both eyes fulfilling inclusion criteria, the right eye was taken as study eye and only one eye from each patient was taken for this study. Based on the age of the patients, the patients were categorized into three groups. The young group had patients age between 20 to 39 years totaling 29, 29 eyes; middle aged patients age between 40 to 59 years was 30, 30 eyes; elderly patients age 60 years and above was 31, 31 eyes. To complete the overall OSDI, SIT, FBUT, and corneal FLCS scores at TD 0, all patients underwent an examination by the same researcher–physician–ophthalmologist.

Therapeutic method: For 28 days, patients in each group were given poly-ethylene glycol eye drops 04 times a day and vitamin A Palmitate ophthalmic ointment once at night. At seven days, fourteen days, and 28 days after intervention, patients were observed.

Observational index: The same ophthalmologist evaluated all patients to accomplish their OSDI score, SIT, FBUT, and corneal FLCS rating. All 12 correctly answered questions, with scores ranging from 0 to 100, are included in the OSDI score [10]. For SIT, soak a 5 mm x 35 mm standard filter paper strip And fold one end to 5 mm, leave the other end hanging naturally, insert it between the middle and outer third of the lower eyelid. After five min the filter paper was removed and dry eyes can be diagnosed when the wetted length of the filter paper in the rolled up position was less than 10 mm [11].

For FBUT the fluorescein test strip was instilled in the lower eyelid conjunctival sac in the patient. This study has therefore used the cobalt blue light from the slit lamp microscope, the blinking of the patient and gazing forward while using the stopwatch. The duration between the point at which the patient's eyes were opened after the last blink until the first randomly distributed, dry spot on the cornea was measured. Whenever the average time is less than 10 seconds, there is a likelihood that the eye is dry[11].

When rating corneal FLCS, a sterile fluorescein test strip was gently placed into the inferior fornix of the patient's conjunctival sac. Iris staining scores for corneal lesions ranged from 0 to 3 points of points The scores of 0 indicates no staining, 1-point staning was punctate, 2 points denoted spotty staining while 3 points indicated ulcers, filaments or filament fusion[12].

Statistical analysis

SPSS version 23.0 was used to conduct the analysis (IBM Corp.). Values are shown as both the mean and standard deviation or as numbers (percentage). For comparing categorical data between clusters, the chi-square test had been used, while multiple methods had been used to analyze continuous variables. These methods included the one-way analysis of variance (ANOVA). Using a two-way ANOVA, we tested the significance of the OSDI, SIT, FBUT, and FLCS scores before the Bonferroni test. A statistically significant variation was deemed to exist when P 0.05 was obtained.

RESULTS

Before the intervention, there was no significant difference in gender, dry eye length of time, diabetes background, smoking record, OSDI score, SIT, FBUT, or FLCS score between the three groups (P > 0.05). (Table 1).

Table No. 1: Basicinformation

Variables	Young group (n=29)	Middle-age group (n 30)	Elder group (n 31)	PValue
Male, n (%)	14(48.28)	14(46.67)	16(51.61)	0.925
Dry eye duration (month) (means ± SD)	4.37 ± 2.73	4.28 ± 2.30	4.56 ± 2.80	0.912
Diabetes history, n (%)	05(17.24)	8(26.67)	7(22.58)	0.683
Smoking history, n (%)	08(27.59)	6(20)	6(19.35)	0.783
OSDIScore (means±SD)	26.00±5.47	26.10±5.55	25.84±5.24	0.979
SIT (mm/5min) (means ± SD)	04.59 ± 01.24	04.50 ± 01.17	4.42 ± 1.29	0.872
FBUT (s) (means ± SD)	04.31 ± 01.34	04.13 ± 01.55	4.00 ± 1.39	0.682
FLCS score(means±SD)	03.10 ± 1.94	03.23 ± 1.87	3.45 ± 1.71	0.794
The OSDI is an index of ocularsurfacedisease;SIT is the SchirmerItest;FBUT is the fluoresceinbreakuptime;and FLCS is t cornealfluorescencestaining.				

The OSDI score was not statistically distinct between the fractions, as shown in Table 2, and there was a considerable time effect (F = 427.21, P 0.001) that was discovered. Time and collaboration was also significant (F = 7.01, P 0.001). At each time point before and after intervention, there were significant statistical variations between the three groups in terms of within-group comparisons (all P 0.001).

Table No. 2: OSDI score among three groups.

Variables(means±SD)	Young group (n = 29)	Middle-age group (n = 30)	Elder group (n = 31)	Mixed ANONA (P value)		
				Group effect	Time effect	Interaction effect
Before treatment	26.07±5.47	26.10±5.55	25.84± 5.24	0.057	< 0.001	0.001
7 days after treatment	23.31±4.98	20.30±4.47	21.32 ± 4.20*			
14 days after treatment	19.10±4.14*	15.97±3.82*#	17.74 ± 3.68*			
28 days after treatment	14.97±3.91*#&	10.67± 2.92*#&	13.26 ± 3.74*#&			

OSDI, ocular surface disease index
*P < 0.05, compared with OSDI score before treatment
#P < 0.05, compared with OSDI score 7 days after treatment
&P < 0.05, compared with OSDI score 14 days after treatment

An important time impact was also discovered (F = 80.87, P 0.001), as well as a statistically significant difference in SIT between the three groups (F = 350.61, P 0.001). Groups and time interacted significantly (F = 10.70, P 0.001) in this study. Both the middle-aged group and the elder group's SIT at 14 and 28 days post-treatment were lower than those of the young group (all P 0.001). Elderly patients had lower SIT at 7, 14, and 28 days post-treatment (all P 0.001) than middle-aged patients. There had been statistically significant variations between the three clusters at each time point before and after treatment in terms of within-group comparisons (all P 0.001) (Table 3).

Table No. 3: SIT among three groups.

Variables(means±SD)	**Young group (n = 29)**	**Middle-age group (n = 30)**	**Elder group (n = 31)**	**Mixed ANONA (P value)**		
				Group effect	**Time effect**	**Interaction effect**
Before treatment	4.59±1.24	4.50±1.17	4.42±1.29	< 0.001	< 0.001	< 0.001
7 days after treatment	6.55±1.40	6.10±1.52	5.10±1.51*			
14 days after treatment	8.41±1.94*	7.40±1.83*#	6.23±1.56*			
28 days after treatment	9.72±1.77*#&	8.10±1.45*#&	6.97±1.45*#&			

SIT, Schirmer I test
*P < 0.05, compared with SIT before treatment
#P < 0.05, compared with SIT 7 days after treatment
&P < 0.05, compared with SIT 14 days after treatment
aP<0.05, compared with young group
bP<0.05, compared with middle-age group

According to Table 4, there was no statistically significant difference in FUBT between the groups (F = 2.66, P = 0.08), but there was a significant time effect (F = 56.63, P 0.001). Additionally, there was an important interface between time and groups (F = 4.58, P 0.001). In neither the middle-aged group nor the elder group, there were any appreciable differences between FUBT at 28 days after treatment and FUBT at 14 days after treatment. It is observed that other time points, prior to and after procedure, also showed statistically significant variations between the three groups (all P 0.001).

Table 4: FUBT among three groups.

Variables(means±SD)	Young group (n = 29)	Middle-age group (n = 30)	Elder group (n = 31)	Mixed ANONA (P value)		
				Group effect	Time effect	Interaction effect

Before treatment	4.31±1.34	4.13±1.55	4.00±1.39	0.076	< 0.001	< 0.001
7 days after treatment	5.21±1.61	4.83±1.68*	4.42±2.01*			
14 days after treatment	5.86±1.87*	5.33±1.69*#	5.00±1.93*			
28 days after treatment	6.93±1.83*#&	5.73±2.02*#&	5.13±1.98*#&			
FBUT, fluorescein break up time *P < 0.05, compared with FBUT before treatment #P < 0.05, compared with FBUT 7 days after treatment &P < 0.05, compared with FBUT 14 days after treatment						

Table 5 demonstrates that there was no statistically significant difference in FLCS score between the groups (F = 1.23, P = 0.30), and that there was a significant time effect (F = 49.625, P 0.001). Time and group interactions were not significant (F = 1.533, P = 0.170). Regarding differences within groups, the FLCS score was lower at 28 days post-treatment than it was at 7, 14, and 28 days post-treatment (all P 0.001).

Table 5: The FLCS score among three groups.

Variables(means±SD)	Young group (n = 29)	Middle-age group (n = 30)	Elder group (n = 31)	Mixed ANONA (P value)		
				Group effect	Time effect	Interaction effect
Before treatment	3.1 ± 1.94	3.23 ± 1.87	3.45 ± 1.71	0.299	< 0.001	0.170
7 days after treatment	2.76 ± 1.90	3.07 ± 1.43	3.13 ± 1.78*			
14 days after treatment	2.41 ± 1.78*	2.73 ± 1.78*#	2.94 ± 1.71*			
28 days after treatment	1.10 ± 0.82*#&	1.70 ± 1.32*#&	2.32 ± 1.50*#&			
FLCS, corneal fluorescence staining *P<0.05,comparedwithFLCSscorebeforetreatment #P<0.05,comparedwithFLCSscore7daysaftertreatment &P<0.05,comparedwithFLCSscore14daysaftertreatment						

DISCUSSION

According to subsequent observational studies, the pervasiveness of dry eye has risen exponentially, and there is a significant correlation between increasing age and associated symptoms, diagnostic markers of dry eye, aqueous tear inadequacy, and meibomian gland impotence[13, 14]. As a result, dry eye is described as being multifactorial and associated with aging to yield long term impacts on the global health the chronic condition with the rate of exposure to various environmental and biological factors affecting hormonal regulation and tear film balance[15, 16]. More patients will develop dry eyes as the proportion of older people increases, and people live longer. Therefore, the optimal understanding of aged dry eye and the status has become essential to improve the current situation and promote therapeutic approaches[17].

Indeed, the mean OSDI scores, SIT, FBUT, and FLCS scores of the OSDI scores in three groups at 28 days after therapy had been significantly better than those at the start of therapy and at 7 days following treatment suggesting that extended treatment of dry eyes is better. At every time point at least before and after hospitalization there had been real differences among the three groups at different statistical levels. Regarding the possibility that aggregate dose resulting from progress in science and technology and risk decisions may differ by generation, the middle age group's OSDI scores at each assessment point were, on balance, smaller than those of the other groups but the difference was not statistically significant[18].

The best method to assess the tear production is SIT and the patients' evidences of ocular surface distress and cosmetic facial appearance of eyes can be made better with enhanced tear production. SIT was lower in older group in this investigation at 7, 14 and 28 days after therapy than in middle aged group. As for the patients which are over 60, the overall prognosis and rate of recovery for tear insufficiency cause is even more impressive of the patients which are below 60 years[18]. The research here postulate that the cause is that sex hormones may indirectly influence tear production through effects on the ocular surface environment, and also as people age, the level of the hormone gradually drops, and this has some acclerate effect on tear production[19, 20]. Data obtained in the tear secretion test indicate that hormone replacement therapy is beneficial for the efficiency of lacrimal excretion and its dependence on age[21]. Referring to inter-group differences in clinical efficacy of dry eye, the tear break-up time, specifically in SIT, are referred to as tear specific functions where specific discrete components a number of these units often have been found to be dysphonic. Encapsulated lobules are

glandular structures of the standard lacrimal gland, where acinar cells occur predominantly at a concentration of 80%. These authors have concluded from an animal study that there is a pathway of acinar alterations from being purely serous to serous-mucinous acinus that transforms, gradually and due to age, into being mucinous acinus. The other pathological changes includes: excessive of structural failure, mast cell infiltration, periductal fibrosis, acinar atrophy and chronic inflammation are observed in this gland as one ages. For mice 3–5 months of age, 20–24 months of age, the functional ability of the acini to synthesize proteins and excrete them steadily decreased or disappeared[23]. Morphological and secretory alterations are responsible for tear production declines with age.

CONCLUSION

Patients with dry eyes are given a 28-day course of topical medications that lubricate the ocular surface and promote repair. These medications can relieve symptoms, encourage tear production, enhance tear film stability, and aid in the restoration of corneal and ocular surface integration. A persistent therapy is required for this chronic, long-term eye disease. Patients with light to moderate dry eye are impacted by age, and tear production is the most major factor. To safeguard the ocular surface, dry eye should be identified and treated as soon as possible.

Author's Contribution:

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Data Analysis:	Fayaz Ahmed, Abdul Sattar
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Final Approval of version:	By all above authors

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Original Article

Comparison of Intrauterine Versus Per-Rectal Misoprostol in the Prevention of Postpartum Haemorrhage During Caesarean Section

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ABSTRACT

Objective: Current study is aimed to compare the frequency of postpartum haemorrhage in high-risk females undergoing caesarean sections who receive either intrauterine or per-rectal misoprostol.

Study Design: Prospective observational study

Place and Duration of Study: This study was conducted at the Sandeman Provincial Hospital Quetta during March 2022 till October 2022.

Methods: In this study, a total of 170 women undergoing caesarean section were randomly distributed into two study groups. Group A received 400 mg of intrauterine misoprostol, while Group B received 400 mg of per-rectal misoprostol. Maternal outcomes such as blood loss, haemoglobin difference, duration of surgery, and need for blood transfusion were compared. Neonatal outcomes and adverse events like fever, nausea, shivering, and headache were also assessed.

Results: The mean value of lost blood was significantly lesser in Group A (670 ± 190 mL) compared to Group B (750 ± 210 mL) (p = 0.04). The haemoglobin change was also less in Group A (0.85 ± 0.65 g/dL) versus Group B (1.05 ± 0.75 g/dL) (p = 0.03). Adverse events like shivering were more common in Group A (19% vs. 4%, p = 0.001).

Conclusion: There were no significant differences between the groups in terms of the need for blood transfusion or neonatal outcomes. Misoprostol effectively managed PPH via both administration routes, but intrauterine misoprostol significantly reduced intraoperative and postoperative blood loss compared to the rectal route, with temporary shivering as the only notable side effect.

Key Words: Postpartum Hemorrhage (PPH), Intrauterine Misoprostol, Rectal Misoprostol, Cesarean Section (CS)

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INTRODUCTION

Postpartum haemorrhage (PPH) is defined as blood loss over 1000 millilitres during and after cesarean section (CS)[1]. Even in high-income nations, PPH, the most frequent type of significant obstetric haemorrhage, continues to be a major global reason of the morbidity and mortality of mothers[2,3]. PPH develops from numerous reasons, including uterine atony[4].

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PPH has a prevalence incidence of 6–10.8% worldwide, making it the leading cause of maternal fatalities (a quarter of all maternal deaths)[5]. PPH is the cause of more than one-third of maternal deaths in Asia and Africa[6]. A significant contributing factor to morbidity and mortality of mothers, particularly in low-resource nations where it accounts for about 25% of all deaths of mothers globally, is excessive bleeding during and after CS[7]. Furthermore, an increase in the rate of CS has been partially ascribed to the fact that the rate of PPH is rising in industrialised nations as well. PPH prevalence following CS is expected to be 3% (0.6–6.4%).

Preventive steps should be done to lower intraoperative blood waste during CS in order to lower the risks of blood transfusion and post-operative morbidity. As soon as the foetus is delivered, oxytocin is regularly administered. However, because it can result in tachycardia and hypotension, oxytocin might not be the best medication for preventing PPH in women with preeclampsia, prolong labor, or cardiac illness[8]. Furthermore, oxytocin needs to be kept refrigerated, which is impractical in developing nations because it is

light- and heat-sensitive. Prostaglandins are frequently used in obstetric medicine for the prevention and, more specifically, the management of postpartum haemorrhage. They also have uterotonic effects[8]. The most widely prescribed prostaglandin used off-label for preventing postpartum haemorrhage is misoprostol, an analogue of prostaglandin E1, because of its many benefits, which include low cost, simplicity of administration through different routes, and thermal stability (easy storage)[8]. But there is still conflicting information on both its safety and effectiveness, especially when it comes to the best way to administer it. There are several ways to deliver misoprostol, including intrauterine, per-rectal, buccal, oral, and sublingual. These routes have been investigated the most for preventing postpartum haemorrhage following caesarean sections. Certain studies support per-rectal delivery of misoprostol, whereas others demonstrate that intrauterine misoprostol dramatically lowers PPH rates [9]. The purpose of this research is to compare the incidence of postpartum haemorrhage in females undergoing caesarean sections who received intrauterine versus per-rectal misoprostol. The aim of current study is to add local data to the existing knowledge and offer support for applying these interventions in regional clinical practice. Current study is aimed to compare the frequency of postpartum haemorrhage in high-risk females undergoing caesarean sections who receive either intrauterine or per-rectal misoprostol.

METHODS

This prospective observational study was conducted at Sandeman Provincial Hospital Quetta during March 2022 till October 2022. A total of 170 patients undergoing cesarean delivery were enrolled using non-probability consecutive sampling, with 85 patients allocated to each study group. The sample size was determined to detect a clinically significant difference in the prevention of postpartum hemorrhage (PPH) between two methods of misoprostol administration, with a 5% significance level ($\alpha = 0.05$) and 80% power ($\beta = 0.2$). The sample size was calculated using the following formula:

$$n = \left(\frac{Z_{\alpha/2} + Z_{\beta}{}^{2} \times p1(1-p1) + p2(1-p2)}{(p1-p2)^{2}} \right)$$

Where, $Z_{(\alpha/2)}$ is the critical value at a 95% confidence interval (1.96), Z_{β} presents 80% power (0.84), $p1$ and $p2$ are the expected proportions of PPH in both groups based on previous studies [15]. A total sample size of 170 patients (85 in each group) was calculated. Patients were divided into two groups using the lottery method. Group A consisted of 85 patients who received 400 mg of intrauterine misoprostol placed at the uterine fundus immediately after placental delivery during uterine suturing. Group B included 85 patients who received 400 mg of misoprostol administered per-rectal immediately after placental delivery. Patients in both groups were monitored for 24 hours postpartum, and blood loss was measured six hours after delivery. PPH was defined as blood loss exceeding 1000 mL within the first 24 hours postpartum, assessed using a combination of suction volume and gauze saturation by a visual analogue method. Written informed consent was obtained from all participants before inclusion in the study, ensuring they fully understood the purpose, procedures, and potential risks involved.

Women undergoing cesarean delivery, both elective and emergency, for single or multiple gestations at term (37–40 weeks) were included. The study also included patients with a history of previous cesarean sections. Women with known hypersensitivity to prostaglandins, liver or coagulation disorders, heart disease, renal disease, a history of uterine rupture, or contraindicated for the use of prostaglandins were no included in the study.

Data were collected through a structured questionnaire and hospital records, supplemented by consultations with healthcare providers. Information on patient demographics, reproductive history, pregnancy details, labor and delivery characteristics, and maternal and neonatal outcomes were collected. Hemoglobin levels were measured pre-operatively and 24 hours post-operatively to evaluate blood loss. The primary outcome was the occurrence of PPH, while secondary outcomes included changes in hemoglobin levels, the need for additional uterotonic agents, blood transfusion requirements, and adverse effects of the study drug.

Data were analyzed using SPSS version 27. Descriptive statistics were used to summarize patient characteristics, and differences between the two groups were assessed using the independent t-test for quantitative variables and the chi-square or Fisher's exact test for categorical variables. A p-value of less than 0.05 was considered statistically significant.

RESULTS

Table 1 provides a summary of the maternal and neonatal demographic statistics for both groups. There were no discernible differences between the two groups when age, parity, gestational age, history of prior caesarean sections, and neonatal birth weight were analyzed. Table 2 lists each group's indications for a CS.

Table No. 1: Demographic characteristics of the women.

Variable	Group-A (n=85)	Group B (n = 85)	T-stat/ p-value
Age (mean±SD) (years)	27.4 ± 4.3	28.0 ± 4.5	–0.78, 0.43

Parity			
Primigravida	39 (45.9%)	40 (47.1%)	0.11, 0.95
Multigravida			
1	35 (41.2%)	30 (35.3%)	
2	8 (9.4%)	10 (11.8%)	
3	2 (2.4%)	5 (5.9%)	
Previous LSCS	17 (20.0%)	19 (22.4%)	0.13, 0.72
Mean gestation in weeks (mean± SD)	38.4 ± 1.5	38.3 ± 1.3	0.45, 0.65
Weight of baby at birth (mean± SD KGs)	2.7 ± 0.4	2.75 ± 0.5	–0.51, 0.61

LSCS: lower segment cesarean section; Group A received intrauterine misoprostol (400 mg); Group B received per-rectal misoprostol (400 mg). A p-value of <0.05 is considered significant.

Table No. 2: Reasons of cesarean surgery.

Indications	Group A (n = 85)	Group B (n = 85)
Fetal distress	12 (14.1%)	10 (11.8%)
Meconium-stained liquor	5 (5.9%)	7 (8.2%)
Bad obstetric history	2 (2.4%)	3 (3.5%)
Breech	6 (7.1%)	4 (4.7%)
Non-progress of labor	8 (9.4%)	9 (10.6%)
Preeclampsia	5 (5.9%)	7 (8.2%)
Previous LSCS	10 (11.8%)	9 (10.6%)
Twin gestation	2 (2.4%)	3 (3.5%)
Cephalopelvic disproportion	4 (4.7%)	3 (3.5%)
Failed induction	7 (8.2%)	6 (7.1%)
Oligohydramnios	3 (3.5%)	5 (5.9%)

Group A received intrauterine misoprostol (400 mg); Group B received per-rectal misoprostol (400 mg).

No patients required a switch from local to general anesthesia during the surgical procedures. The average loss of blood was significantly lesser in the Group A (650 ± 190 mL) compared to Group B (740 ± 220 mL), with a statistically significant difference (p = 0.02) as shown in Table 3. The mean hemoglobin (Hb) levels before and after surgery were comparable between the two groups, with Group A showing a change of 0.85 ± 0.60 gm/dL and Group B showing 1.00 ± 0.85 gm/dL (p = 0.26). However, Group A had a statistically significant lower requirement for additional oxytocics during the procedures, with only 5 patients (5.9%) needing extra doses compared to 12 patients (14.1%) in Group B (p = 0.04).

The mean length of surgery duration was comparable between Group A (65.5 ± 12.0 minutes) and Group B (66.3 ± 11.5 minutes) (p = 0.45). Additionally, there was no significant difference in the requirement for blood transfusions between the two groups, as detailed in Table 3.

Table No. 3: Outcome measures.

Variable	Group-A (n=85)	Group-B (n=85)	T-statistic, p-value
Blood volume (mL)	650 ± 190	740 ± 220	2.44, 0.02
Before CS hemoglobin in gm%	11.75 ± 1.30	11.65 ± 1.45	0.56, 0.58
After CS hemoglobin in gm%	10.90 ± 1.25	10.60 ± 1.50	1.05, 0.30
Hemoglobin difference	0.85 ± 0.60	1.00 ± 0.85	1.08, 0.26
Length of surgery in minutes	65.5 ± 12.0	66.3 ± 11.5	0.45, 0.45
Need for additional oxytocics	5 (5.9%)	12 (14.1%)	4.12, 0.04
Need for blood transfusion	4 (4.7%)	5 (5.9%)	0.04, 0.84

Group A received intrauterine misoprostol (400 mg); Group B received per-rectal misoprostol (400 mg). Hb: hemoglobin. A p-value of <0.05 is considered significant.

Maternal side effects are detailed in Table 4. The usual side-effects observed, were nausea/vomiting, headache, hyperthermia, metal-like taste, and dizziness, were similar between the two groups. But, the occurrence of shivering was greater significantly in Group A (20%) compared to Group B (3%), with a p-value of 0.001 (OR = 9.0, 95% CI: 2.5–32.3).

Table No. 4: Comparison of the Side-effects between the two groups.

Variable	Group A (n = 85)	Group B (n = 85)	Chi-square stat, p-value	OR (95% CI)
Fever	8 (9.4%)	4 (4.7%)	2.13, 0.14	2.1 (0.60–7.21)
Nausea, vomiting	9 (10.6%)	6 (7.1%)	0.50, 0.48	1.56 (0.52–4.66)
Shivering	17 (20.0%)	3 (3.5%)	14.82, 0.001	9.0 (2.5–32.3)
Headache	5 (5.9%)	3 (3.5%)	0.61, 0.43	1.68 (0.31–9.05)
Metallic taste	4 (4.7%)	2 (2.4%)	0.65, 0.42	2.00 (0.30–13.40)
Dizziness	5 (5.9%)	4 (4.7%)	0.11, 0.73	1.25 (0.31–4.93)

Group A received intrauterine misoprostol (400 mg); Group B received per-rectal misoprostol (400 mg). A p-value of <0.05 is considered significant.

DISCUSSION

The prevention and treatment of PPH should be given top priority for all women undergoing vaginal or caesarean deliveries, especially for those who are anaemic or having conditions like preeclampsia and unable to tolerate even a small quantity of blood loss. When it comes to managing intraoperative and postoperative bleeding, misoprostol is just as useful as oxytocin. Misoprostol plus oxytocin has also been shown to reduce intra- and post-operative haemorrhage during cardioscopy (CS) more effectively than oxytocin alone. According to Ezra Sullivan[12], misoprostol's long-lasting influence on uterine contractility after oxytocin's first, fast effect on it could be the likely cause of the decrease in bleeding.

Misoprostol has been administered during CS by oral, buccal, sublingual, intrauterine, intravaginal, and rectal routes at different dosages ranging from 400 to 800 mg, according to a literature study. However, no prior research has examined the differences between the intrauterine and rectal routes of misoprostol delivery. Our results showed that, with means of 650 ± 190 mL and 740 ± 220 mL, respectively, the intrauterine misoprostol group (Group A) had considerably less average blood loss than the per-rectal group (Group B) ($p = 0.02$). Group A also required considerably fewer additional doses of oxytocics than Group B, with just 5 patients (5.9%) requiring additional treatment, compared to 12 patients (14.1%) in Group B ($p = 0.04$). QuirogaDıaz et al.[13] brought forward the idea of using intrauterine misoprostol to prevent PPH. On the other hand, they utilised 800 mg on 200 individuals in their study. Also, they reported few unfavourable incidents. The effectiveness of misoprostol, taken orally or sublingually, in lowering the quantity of blood loss following childbirth has been the subject of multiple research. According to certain studies, misoprostol 400 mg is just as successful as syntometrine or oxytocin, if not more so[14]. When combined with oxytocin, rectal misoprostol reduced intraoperative and postoperative blood loss, the mean decline in haematocrit level, and the need for further uterotonics[15]. Misoprostol inserted directly into the uterus cavity has the potential to promote faster and more efficient ripening by increasing local concentrations of the medication and so increasing its effectiveness. Our findings are supported by the possibility that this local effect lowers blood loss during surgery and reduces the need for further uterotonics. The difference in haemoglobin levels following surgery did not achieve statistical significance ($p = 0.26$), despite the fact that the mean haemoglobin levels before and after surgery were similar between the two groups. This result implies that misoprostol administration techniques may both provide sufficient pre-operative cervical ripening without appreciably affecting haemoglobin levels or raising the risk of anaemia following surgery.

CONCLUSION

PPH was well managed with misoprostol administered via either of the two methods. On the other hand, when compared to the rectal route of administration, misoprostol administered intrauterine during CS is linked to a clinically significant decrease in intraoperative and postoperative blood loss. Furthermore, intrauterine mode of misoprostol administration can be suitably delivered intraoperatively with the only apparent side effect being temporary shivering.

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Original Article

Age-Related Hearing Loss in Underprivileged Population of Pakistan

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ABSTRACT

Objective: To determine the frequency and severity of age-related hearing loss.
Study Design: Cross-sectional study
P0lace and Duration of Study: This study was conducted at the Department of ENT Head &Neck Surgery, Lahore Medical and Dental College, Ghurki Trust and Teaching Hospital Lahore from 1st January 2024 to 30th June 2024.
Methods: Three hundred and eighty adults patients aged between 60-85 years, diagnosed with hearing loss were enrolled. Participants underwent otoscopy examination, tympanometry, and pure tone audiometry. All patients reporting with hearing loss, tinnitus, or vertigo were included. History of ear surgery, chronic discharge, impacted wax or ototoxic medications and noise exposure were excluded.
Results: 15.7% of patients with ear-related symptoms had incidental findings of hearing loss.10.5% had mild, 28.9% had moderate, 25.4% had moderately severe, 31% had severe, 4.2% had profound in sensorineural hearing loss. 1.2% of cases had predominantly mild to moderate was found conductive hearing loss. 30.6% of cases were in moderate to severe ranges.71.3% had type A findings in mixed hearing loss. According other types, type As 0.7%, Ad 8.3%, B 10% and C 9.1%.Incidental findings were 15.7% of total, with non-incidental findings at 84.3%.Moderate and moderately severe hearing loss was the most common. Sensorineural hearing loss(SNHL) was prevalent with severe cases, while conductive hearing loss (CHL) was rare and generally mild of hearing loss severity. Overall, severe SNHL and mixed hearing loss were the most frequent types of hearing loss, with few cases of CHL.
Conclusion: The high rates of moderate to severe sensorineural and mixed hearing loss in Pakistan's underprivileged population highlight the urgent need for early detection and better healthcare access to address age-related hearing loss.
Key Words: Age-related hearing loss, Presbyacusis, Cochlear aging, Auditory system deterioration, Ototoxic drugs, Hearing aids, Cochlear implants, Soundlocalization, Social isolation.

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INTRODUCTION

Hearing loss in the elderly, commonly known as presbycusis, is a prevalent issue that significantly affects the quality of life among older adults. This condition arises due to factors such as cochlear aging, chronic health conditions, deterioration of the auditory system, prolonged exposure to noise, and ototoxic drug use.[1,2]

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Presbycusis often results in difficulties with understanding speech in noisy environments, poor sound localization, and diminished central auditory processing.[3]

In Pakistan, the elderly population is projected to grow substantially, from 7.34 million in 1998 to an estimated 22.07 million by 2023.[4] This demographic trend highlights the increasing need to address age-related hearing loss, which can lead to social isolation, reduced self-esteem, and greater reliance on others.[5] Standardized audiometric evaluations are crucial for diagnosing hearing impairment, with hearing aids and cochlear implants serving as the primary treatments for moderate to severe cases.[6] This study focuses on individuals aged 60 and above to explore hearing loss within this expanding population.

Age related hearing loss or presbycusis is the most common self-reported issue in old age due to hearing impairment. It mainly occurs due to cochlear aging, multiple chronic conditions, deterioration of auditory system, continuous noise exposure and prolonged use of ototoxic drugs. Presbycusis is characterized by difficult speech understanding in noisy surroundings, poor localization of sound source, reduced central

processing of auditory stimuli and impaired hearing. Hearing provide us with crucial environmental information, such as the presence of danger signals, smoke alarms, and warning cries that must be recognized.[7]

Hearing loss is classified into various categories based on the severity of the condition. It can be mild, moderate, moderately severe, severe and profound. With increasing age, hearing sensitivity rises sharply. In 2008, a Pakistani report indicated that the elderly population in our nation was 7.34 million in 1998, and it is projected to increase to 22.07 million by the year of 2023.[8]

Age related hearing loss can lead to feelings of frustration, social isolation, heightened reliance on others for support, diminished self-esteem, loneliness, and the necessity for hospital care. The worldwide consensus is that standardized audiometric evaluation is the predominant method for diagnosing hearing impairment in an individual.[9]

Hearing aids and cochlear implants are the primary tools for treating moderate to severe presbycusis. Utilizing hearing aids greatly enhances the quality of life for patients, making their use highly recommended. There is no consensus on when a person is considered old. Some suggest that the onset of old age begins around 60, approximately the age of retirement in many developed nations.[10] This study will help our primary results of hearing investigation in patients who are 60 years older and above with complain of hearing impairment.

METHODS

This cross-sectional study was conducted at Audiology clinic within the ENT Department of Ghurki Trust Teaching Hospital, Lahore from 1st January 2024 to 30th June 2024 vide IRB letter No. LMDC/20575/23 dated 6th December 2023. A total of 380 adults aged between 60 and 85 years who had been diagnosed with hearing impairment were enrolled. Participants were selected using a convenience sampling approach. The assessment included otoscopy, tympanometry, and pure tone audiometry. The study concentrated on individuals reporting audiological issues similar as hearing loss, tinnitus, vertigo, dizziness, or a sensation of fullness in the ears. Both men and women within the specified age range were included, while those with a history of ear surgery, chronic ear discharge, impacted ear wax or exposure to ototoxic substances or loud noises were excluded. Each participant passed an otoscopic examination to check the external ear canal and tympanic membrane, tympanometry to assess middle ear function, and pure tone audiometry to measure the level of hearing loss. The data was entered and analyzed through SPSS-25.

RESULTS

Incidental findings of hearing loss in patients suffering from ear related symptoms were 15.7% whereas non-incidental findings account for 84.3%.This showed that a significant majority of the findings were expected (non-incidental) [Fig. 1]. 68.9% of patients presenting with hearing related symptoms presented with sensorineural hearing loss of which 10.5% were mild, 28.9% were moderate, 25.4% were moderately severe, 31% were severe and 4.2% were profound as observed. Conductive hearing loss is predominantly mild to moderate, with very few cases of severe or profound hearing loss. Sensorineural hearing loss exhibits a range of severities, with a significant number of cases in the moderately severe to profound categories. Mixed HL also shows a higher severity, with a notable number of cases in the severe to moderately severe range (Fig. 2). In tympanometry, it was found that 71.3% of patients presented with type A findings. For Type As, Ad, B, and C the findings were 0.7%, 8.3%, 10% and 9.1% respectively. The audiometry findings appear to show a significant concentration of findings in one category, suggesting a common pattern or trend in hearing loss measurements across the sample, the primarily encountered non-incidental findings in hearing loss cases. Sensorineural hearing loss (SNHL) was the most common type of hearing loss observed, and the severity of hearing loss often ranged from moderate to moderately severe. Mixed hearing loss was also significant, with a high proportion of cases in the severe to moderately severe categories. Conductive hearing loss (CHL) was much less frequent and typically mild to moderate. These results suggest that severe hearing loss, particularly SNHL and mixed HL, is prevalent among the population studied, with fewer cases of CHL (Fig. 3).

Conductive hearing loss accounts for 1.3% of cases, sensorineural hearing loss for 63.9% and mixed hearing loss for 34.8%. In terms of severity, normal hearing was observed in 1.3% of cases, mild hearing loss was noted in 9.3% of cases, moderate hearing loss was seen in 21.3% of cases, moderately severe in 28.9% of cases, severe in 30.3% and profound in 8.9%.This shows that moderate and moderately severe hearing loss is the most common severity observed (Table 1).For CHL, all cases were either mild or moderate, there was a distribution across all severity levels, with a notable increase in severity from moderate to profound SNHL and mixed HL exhibited a similar trend to SNHL, with most cases being moderately severe or severe (Table 2).

Table No. 1: Frequency of hearing loss and its types (n=380)

Variable	Frequency (%)
CHL	5 (1.3%)
SNHL	243 (63.9%)

Mixed hearing loss	132 (34.8%)
Severity	
Normal	5 (1.3%)
Mild	35 (9.3%)
Moderate	81 (21.3%)
Moderately severe	110 (28.9%)
Severe	115 (30.3%)
Profound	34 (8.9%)

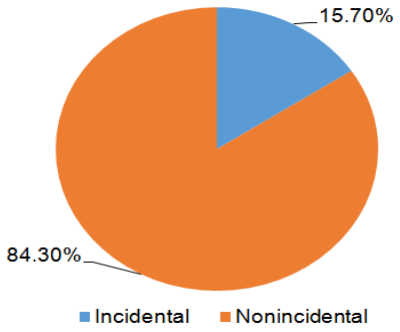

Figure No. 1: Findings of incidental and non-incidental

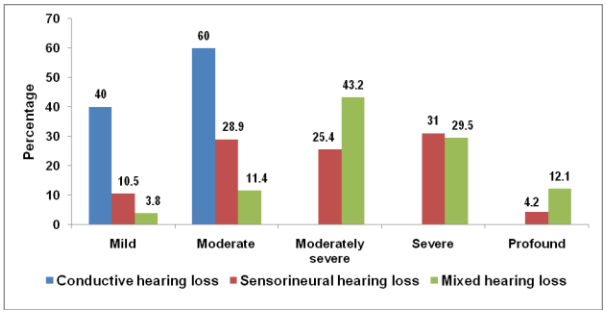

Figure No. 2: Frequency of type of hearing loss

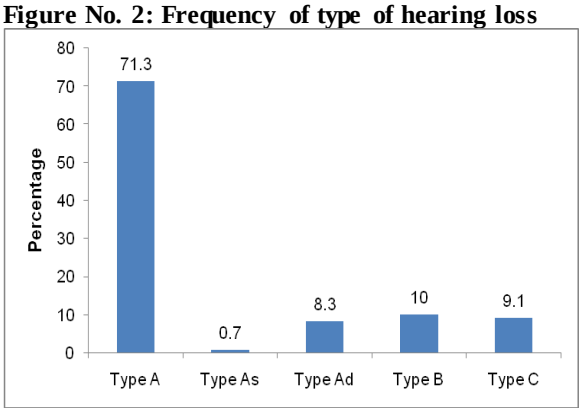

Figure No. 3: Frequency of audiometry findings

DISCUSSION

The results of this study on age-related hearing loss (ARHL) in the underprivileged population of Pakistan provide a detailed overview of the distribution and severity of hearing loss within this group. The data indicate that non-incidental findings are predominant (84.3%), suggesting that hearing loss was largely expected among the sampled population. Sensorineural hearing loss (SNHL) was the most common type, accounting for 66.4% of cases, with moderate to moderately severe hearing loss being the most frequently observed severity.[11]

These findings align with other research conducted in Pakistan. For instance, a study in rural Punjab found that SNHL was the most prevalent type of hearing loss among the elderly, with a significant number of individuals experiencing moderate to severe levels.[12] Similarly, research from Karachi reported that SNHL was predominant among older adults, particularly in underprivileged areas, where factors such as poor healthcare access, lack of awareness, and environmental noise exposure contribute to its high incidence.[13] This study corroborates the high percentage of moderate to moderately severe hearing loss noted in these regions.[14] The Karachi study also highlighted that moderate to moderately severe SNHL was particularly prevalent in low-income areas, attributed to untreated ear infections, prolonged noise exposure, and limited access to hearing aids and medical interventions.[15] The substantial incidence of SNHL in the moderate to moderately severe range underscores a significant public health concern. Age-related hearing loss impacts communication, quality of life, and social engagement, especially where healthcare access is limited.[16]

The low incidence of conductive hearing loss (CHL) observed in this study (1.2%) is notable. Conductive hearing loss is usually linked with treatable conditions such as ear infections or wax build-up; its lower prevalence might indicate either a lower rate of these conditions or a lack of medical treatment leading to underreporting.[17] This contrasts with some rural studies where CHL was more common due to untreated infections.[18] Mixed hearing loss, encompassing both SNHL and CHL, was significant, comprising 30.6% of cases, indicating that many individuals experience multiple contributing factors to their hearing loss, complicating diagnosis and treatment.[19]

The audiometric findings reveal a consistent pattern of hearing loss, potentially reflecting common aetiologies such as noise-induced hearing loss, ototoxicity from medications, or age-related auditory degeneration. The concentration of findings in one category suggests a predominant underlying cause, such as chronic loud noise exposure or high rates of untreated chronic ear diseases.[20] The study's results are consistent with other research conducted in underprivileged populations in Pakistan, where SNHL and moderate to severe hearing loss are prevalent. The low incidence of CHL may reflect different health profiles compared to rural areas where ear infections are more common.[21]

Overall, these findings highlight the critical need for enhanced public health interventions, including hearing screenings, awareness programs, and improved access

to medical care, to address ARHL in Pakistan's underprivileged communities. Further research should investigate the underlying causes and assess the effectiveness of intervention strategies. Comparing these results with other studies emphasizes the substantial burden of hearing loss in Pakistan's underprivileged population and the need for concerted efforts for early detection and management to improve outcomes and quality of life.

CONCLUSION

The significant prevalence of moderate to severe sensorineural and mixed hearing loss in the underprivileged population of Pakistan underscoring the urgent need for targeted public health interventions. The findings emphasize the necessity for early detection and improved access to healthcare to mitigate the impact of age-related hearing loss in these communities.

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Original Article

Association Between BMI and Incidence of Inguinal Hernia in Adult Males

Daulat Azeem Khan and Muhammad Amer Mian

ABSTRACT

Objective: To assess association between incidence of inguinal hernia and body mass index in adult males.

Study Design: A cross-sectional study

Place and Duration of Study: This study was conducted at the Surgery Department of Central Park Teaching Hospital, Lahore from June 2023 to January 2024.

Methods: Non-probability sampling technique was employed and a total of 80 patients were recruited and patients having bilateral inguinal hernia, strangulated hernia and femoral hernia were excluded. Categorical variables were assessed and frequencies and percentages were calculated. Fisher Exact test was employed for the comparison of incidence of hernia in study groups.

Results: A total 80 patients having unilateral inguinal hernia were recruited for the study with the mean age of 28.15 + 13.65 years. Assessment of incidence of hernia and BMI was made, it was observed that 72.5% of the patients (n=58) had right sided inguinal hernia (RIH) while 27.5% of the patients (n=22) had left sided inguinal hernia. It was noted that those patients who had RIH, only 31.38% of the patients had BMI greater than 23.5 kg/m^2 while other patients had BMI lower than cut-off value.

Conclusion: A preventative association of increased BMI with hernia development that needs future more detailed evaluation. A better understanding of these dynamics could element enhancement of risk profile identification and preventive measures in surgical work.

Key Words: Inguinal Hernia, BMI, Surgery, Hernial Repair

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INTRODUCTION

Inguinal hernia is defined as protrusion of abdominal contents into inguinal canal via abdominal wall (direct) or through inguinal ring (indirect). Inguinal hernia repair is one of the most frequent operations performed all over the world, and the frequency is particularly high in adult males[1]. Inguinal hernias cause bulging of abdominal contents through a weak spot in the inguinal canal and although most of them are not dangerous, they may cause pain or cause complications that may need emergency surgery[2]. While recognizing that multiple factors are associated with increased hernia risk, an evaluation of BMI as one of the factors specifically has remained an important issue in clinical and epidemiological research[3]. Body mass index (BMI) is one of the most common Anthropometric measurements, which provides information on an individuals weight according to heights[4,5].

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Even though BMI is considered as unprecise in its ability to separate lean tissue mass from fat tissue, it is still as an effective and common method to evaluate the population statistics of obesity and underweight. It is found that abnormal BMI levels has been associated with many heath related factors such as cardiovascular diseases, diabetes and some forms of cancers[6,7].

From an epidemiologic perspective, previous risk factors for inguinal hernia used include age, genetic pre disposition and lifestyle factors such as lifting of heavy objects and strenuous activities[8]. A number of relatively recent publications, however, point to the fact that body composition and movement of the abdominal wall could contribute to hernia formation. Some studies have suggested that people with higher BMI including the overweight and the obese could apply increased pressure within the abdomen hence risking development of a hernia. Interestingly studies have suggested the opposite: that higher weight with higher BMI increases the probability of reducing the need for an IHR compared to the normal weight individuals. However, some other works indicated that people with BMI less than some certain value, for example, those who experienced bilateral PSIDT and with no adipose tissue or minimal amount of it, may not have enough support structures which could prevent the forces acting on the abdominal wall and, therefore, develop the hernia[9].

Nonetheless, concerning the relationship between BMI and the incidence of the IH in adult males, it seems that existing research provide inconclusive evidence. Therefore, further examination of the effects of BMI on inguinal hernia occurrence is needed with reference to another examinations associating distinct BMI categories. The purpose of this research is to determine the extent to which BMI influences the occurrence of the IH in adult males.

METHODS

A cross-sectional study was conducted in surgery department of Central Park Teaching Hospital from June 2023 to January 2024 after approval (CPMC/IRB-no/1400A) from ethical review board of institutions to determine association between BMI and incidence of inguinal hernia. Non-probability sampling technique was employed and a total of 80 patients were recruited after getting prior written informed consent. Sample size was calculated by using WHO sample size calculator with prevalence of inguinal hernia at 14%, confidence interval at 95% and margin of error at 5%[10]. Patients of unilateral inguinal hernia were included in this study while the patients having bilateral inguinal hernia, strangulated hernia and femoral and any other hernia along with inguinal hernia were excluded from the study.

Sociodemographic details were recorded and variables like age, smoking history, history of constipation, COPD and weight lifting was recorded. Body mass index was calculated by taking the height in meters and weight in kilograms and then by appliance of formula (Body Weight in kg/(height in meters)^2 and patients were clubbed into two groups normal and underweight and group 2 overweight and obese based on south Asian classification of BMI by WHO in which cut off was set at 23.5 kg/m^2, patients having BMI 23.5 or below were included in group 1 while those having BMI greater than cut off value were made part of group 2. For hernia defect size, pulsation and bowel sounds were noted.

Statistical Analysis: Double blinded anonymized data was entered into MS Excel version 2019 and after dual cross-verification it was imported to SPSS version 26.0 for analysis. Categorical variables were assessed and frequencies and percentages were calculated. Fisher Exact test was employed for the comparison of incidence of hernia and associated risk factors in study groups. Pearson correlation was also employed for the assessment of relationship between hernia size and body mass index. Significance value was set at 0.05.

RESULTS

A total 80 patients having unilateral inguinal hernia were recruited for the study with the mean age of 28.15 + 13.65 years and were segregated into two group: Group 1 (having BMI <23.5) and Group 2 with BMI > 23.5 kg/m2. It was observed that in 20% of patients were smoker. Similarly COPD, and hypertension was also more prevalent with significant p-value as explained in table 1 while no prevalence of diabetes was noted insignificant.

Table No.1: Assessment of Associated Risk Factors and Comorbidities in Study Groups

Study Variables	n,(%) (N=80)	P-value
Smoking	16 (20%)	0.002
COPD	10 (12.5%)	0.023*
Diabetes	8 (10%)	0.053
Hypertension	10 (12.5%)	0.002*

Assessment of incidence of hernia and BMI was made, it was observed that 72.5% of the patients (n=58) had right sided inguinal hernia (RIH) while 27.5% of the patients (n=22) had left sided inguinal hernia. It was also studied that as per study protocol; 57.5% of the patients (n=46) had BMI less than 23.5 kg/m^2 while 42.5% had BMI higher than cut off value suggestive for inguinal hernia is more prevalent in patients having lower BMI with significant p-value as explained in table 2.

Table No.2: Assessment of Hernia Side and Occurrence of Hernia based on BMI in Study Population

Study Parameters	Sub Groups	N (%)	p-value
Hernial Side	Right	58, (72.5%)	0.0001
	Left	22, (28%)	
BMI	< 23.5 kg/m^2	46, (57.5%)	0.0001
	>23.5 kg/m^2	34, (42%)	

To comprehend the results hernial site incidence was cross-evaluated based on groups was made as explained in table 3. It was noted that those patients who had RIH, only 31.38% of the patients had BMI greater than 23.5 kg/m^2 while other patients had BMI lower than cut-off value as explained in table 3 suggestive for decrease in hernial incidence with increase in BMI. Similar sort of incidence was noted for LIH as well as explained in table 3.

Table No.3: Comparison of Incidence of Hernia and Groups based on BMI

Hernial Site	N, (%)		p-value
	< 23.5 kg/m^2	>23.5 kg/m^2	
RIH (n=58)	34 (68.62%)	24 (31.38 %)	0.0001
LIH (n=22)	12 (54.54%)	10 (45.46%)	0.0001

DISCUSSION

The purpose of this research was to determine if there is a relationship between BMI and frequency of appearance of inguinal hernia in the male population. Our results indicate that those with lower BMI, less than 23.5 kg/m², have a significantly higher likelihood of developing inguinal hernia operation, both to the right and left, compared with those with higher BMI. This finding is consistent with some earlier works suggesting that low BMI can cause absence or insufficiency of adipose or muscular tissue in the abdominal wall to prevent the occurrence of the hernia[5,11].

The results indicate the relationship between inguinal hernia and BMI the apparent meaning of which suggests that people with lower BMI are more vulnerable to develop IH – especially RIH. This observation may support the hypothesis that decreased amount of fat in combination with potentially weak abdominal muscles in subjects with lower BMI thus offer less protection against intra-abdominal pressure and make it easier for the abdominal contents to herniate through the inguinal canal. In line with this, previous investigations show that low fat mass may weaken the abdominal wall and allow hernia to develop. Notable also is the establishment of the generalized prevalence of RIH among the participants that suggests that the structure of the abdominal wall and hernia location could be associated with body composition and weight distribution[12].

The synthesis of findings regarding the BMI influence on hernia risk shows that there are still many equivocations to establish this link. Contrary to the suggested concept that the elevated intraabdominal pressure due to obesity raises the risk for hernias, the present data lend evidence to the line of thought that lower BMI puts to more likely to develop hernia. These differences may due to the differences of study design, sample size and population characteristics to confirm this relationship, thus; more study of greater scale is required[13].

In addition, the comorbidities established that smoking, COPD and hypertension were associated with a strong correlation to develop inguinal hernias, indicating that life styles might have a direct impact on the disease. The high proportion of the participants who were smokers is in concordance with literature indicating that smoking reduces connective tissue elasticity and therefore increases the incidence of hernias. The same may hold true for inguinal hernias because COPD patients usually experience episodes of coughing which can further raise intra-abdominal pressure[14].

Thus, the results of our study regarding obesity as a risk factor should be taken into account during preoperative preparations for inguinal hernia repair. Knowledge about the characteristics of protective or risk factors of BMI could inform clinical practice decision-making especially on the establishment of preventive health programs for the specific populations[8].

The external and internal constraints of our work also cannot be overlooked. However, the cross-sectional design hampers making causal conclusions, and a relatively small sample might reduce the external validity of our conclusions. Nevertheless, lack of inclusion of patients with bilateral hernias or any other type of hernias may have resulted to selection bias. Future investigations should strive for sample enriching, multicenter research initiatives, in an effort to replicate our observations, as well as elucidate the psychobiological pathways regarding the specific effect of BMI for the emergence of hernias.

CONCLUSION

This work adds meaningful finding towards the correlation between BMI status and the likelihood of developing IH in AM. The observed trend may indicate a preventative association of increased BMI with hernia development that needs future more detailed evaluation. A better understanding of these dynamics could element enhancement of risk profile identification and preventive measures in surgical work.

Author's Contribution:

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Original Article

Pattern of Presentations and Etiological Factors of Fournier's Gangrene

Factors of Fournier's Gangrene

Wajeed Gul Bangash[1], Muhammad Asad[2], Muhammad Ismail Seerat[2], Kiran Rehman[2], Maryam Iftikhar[2] and Sufyan Rauf[2]

ABSTRACT

Objective: The purpose of current study is to outline the pattern of presentation and etiological factors of Fournier's gangrene (FG) at Pakistan Railway Hospital, Rawalpindi, Pakistan.

Study Design: A Prospective observational study

Place and Duration of Study: This study was conducted at the Pakistan Railway Hospital, Rawalpindi from Jan 2024 to June 2024.

Methods: This study included patients above the age of 13. Data collected and analyzed on predesigned proformas. 30 adult patients of FG were included in this study. The inciting event, predisposing conditions, site of involvement, microbiology and outcome were studied in these patients.

Results: The mean age for 30 patients was 54.8 ± 15.19 years. 29 (96.6%) were males and only one (3.3%) was a female. A cause could be traced back in the history of only 18 patients, 3 had urethral stone with a history of manipulation, one had paraphimosis, one had insect bite, 4 (13.3%) had of perineal abscess, 4 (13.3%) had a perirectal abscess, 5 (16.7%) had a urethral stricture. Predisposing factors were present in all of them; 20 (66.6%) were diabetic. One (3.3%) had a history of pelvic irradiation for malignancy, extremes of age (age > 70 years were present in 5 (16.6%) patients, 3 (10%) were immuno-compromised, 1 (3.3%) had a history of malignancy i.e. colonic carcinoma, 2 (6.7%) were on chronic steroid use and none had alcoholism or chemotherapy. The commonest organism isolated was E. coli. All patients were managed with surgical debridement and antibiotics. 6 (20%) patients expired.

Conclusion: FG has high mortality. In most patients the scrotum is involved, urethral strictures and stones are the commonest causes and diabetes is the commonest predisposing condition. Polymicrobial infections mostly containing E. coli and Klebsiella are the commonest.

Key Words: Fournier's Gangrene; necrotizing fasciitis; Etiological factors

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INTRODUCTION

Fournier's gangrene(FG) is a severe condition caused by a combination of bacteria that work together. This infection starts in the perineum and scrotum and spreads through different layers of tissue, causing the death of soft tissue and needs immediate medical attention. It first described a condition in 1883 that was initially believed to be an unexplained gangrene of the scrotum. Unfortunately, the outlook has been grim since then.[1]

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Most infections come from areas such as the rectum, urinary tract, and skin with pain, swelling, or redness. Sometimes crackling sensation or blisters on the skin. Tissue death may also occur in some cases.[2] Certain medical conditions like diabetes, alcoholism, paralysis, neurological problems, cancer, and weakened immune systems can make people more vulnerable to this condition.[3] Bacteria such as staphylococcus, streptococcus, coliforms, pseudomonas, bacteroides, and clostridia are commonly found in tissues. The first step in treating the condition is to have surgery without delay. While additional methods like ultrasound, biopsy, or imaging tests may be used, the diagnosis mainly relies on a clinical assessment.[4] FG can be fatal, with a mortality rate of up to 45%. This is due to complications such as disseminated intravascular coagulopathy or severe sepsis. These complications may cause multi-organ failure.[5]

In 1883, Jean Alfred Fournier reported on a case where five young men suddenly developed gangrene in their penis and scrotum, despite having been healthy before. The cause was unknown.[6] Fournier discovered three main characteristics of the syndrome: it appears

suddenly in a young, healthy man, it progresses quickly, and its cause is unknown[7].

In the decade following 1996, only 600 cases of FG were reported in global literature. The majority of those affected were in their 60s or 70s and had additional underlying medical conditions.[8] Occasional reports have mentioned a similar infection occurring in females.[9] The mortality rate is 40%, and it can go up to 78% if the person is already suffering from sepsis when they are admitted to the hospital.[10]

Managing patients with certain conditions is important to prevent sepsis. After controlling sepsis, different medical fields work together to achieve better results.

METHODS

Pakistan Railway Hospital in Rawalpindi conducted this prospective observational study, from Jan 2024 to June 2024, for six months. This study included 30 patients with Fournier's gangrene. The Institutional Review Committee approved the study protocol. Data was collected from patients after obtaining informed consent through a standardized proforma. The study's eligibility criteria required participants to be thirteen years old, of either gender, suffering from FG. The exclusion criteria included all the patients below the age of thirteen years, and those with maleneys gangrene. All patients were admitted through the Outpatient department in urology and referrals. In the data collection procedure, every patient who came in with FG was hospitalized. They underwent a history and physical examination. History was targeted at identifying any risk factors. Physical examination was done to see the involvement of perineum, scrotum, penis, and suprapubic area. Full blood count, urine examination, urine culture, blood glucose monitoring, and assessments of kidney and liver functions was conducted. All patients underwent debridement and were put on board spectrum antibiotics, fluids and daily dressings. We used SPSS version 14 to analyze the data. For age, we calculated both the mean and standard deviation. For gender, diabetes, hypertension, renal failure, and liver failure, we calculated the frequency and percentage. Results were compiled in a Performa and compared with national and international studies.

RESULTS

Demographics: The study involved 30 patients diagnosed with Fournier's gangrene through history and clinical examination. The age range of the participants varied from 25 to 80 years old, with an average age of 54.8 ± 15.19 years. Out of all the participants, 5 individuals (16.6%) were younger than 40 years old, 15 (50%) were between 40-60 years and 10 (33.3%) were from 60-80 years. 29 (96.6%) were males and only one (3.3%) was a female.

Aetiology (Inciting event): A cause could be traced back in history of only 18 patients.

- 3 had a history of urethral stone with history of manipulation,
- One had paraphimosis
- One had a history of insect bite.
- 4 (13.3%) had history of perineal abscess
- 4 (13.3%) had perirectal abscess
- 5 (16.7%) had a urethral stricture
- Hernia and hemorrhoids were present in none.
- Predisposing conditions

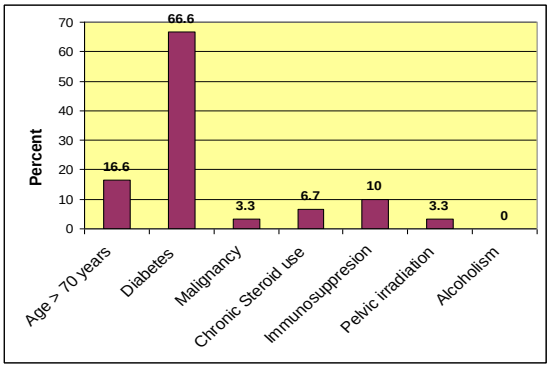

Figure No.1: Predisposing conditions

Predisposing conditions (Figure: 1) of the patients included and are described as under.

- 20 (66.6%) were diabetic.
- One (3.3%) had history of pelvic irradiation for malignancy,
- Extremes of age (age > 70 years was present in 5 (16.6%) patients
- 3 (10%) were immunocompromised as one was post renal transplant and the other two were on DMARDS for rheumatoid arthritis,
- 1 (3.3%) had history of malignancy ie colonic carcinoma,
- 2 (6.7%) were on chronic steroid use for bronchial asthma,
- Alcoholism, chemotherapy, dermatological source

Microbiology: E Coli alone was isolated in 9 (30%), Klebsiella alone in 3 (10%), Enterobacter and Proteus in 1 (3.3%), E Coli and Klebsiella in 6 (20%), E Coli and Klebsiella and Pseudomonas in 1 (3.3%), E Coli &Acinetobacter in 1 (3.3%), Klebsiella and Psedomonas in 2 (6.6%) and no organism was isolated in 7 (23.3%).

Hence, 12 (40%) had single organism isolated either E Coli or Klebsiella. 11 (36.6%) had polymicrobial infection containing a mixture of E Coli, Klebsiella, Proteus, Pseudomonas, Acinetobacter or Enterobacter species.

Site of Fournier's Gangrene: The commonest site of involvement was the scrotum alone in 23 (76.6%) patients. Description of other sites of involvement are as follows; perineum and scrotum in 2 (6.7%), perineum and scrotum & penis in one (3.3%), perineum and scrotum and penis and suprapubic area in one (3.3%), perineum & scrotum and suprapubic area in one

(3.3%), scrotum and suprapubic area in one (3.3%) and vulva in one (3.3%).

Laboratory investigations: The duration of necrotizing infection ranged from 1 to 15 days with a mean duration of 5.29±4.4 days as can be seen in Table 1. The hemoglobin ranged from 5.5 to 14 gm/dl with mean hemoglobin of 10.6±2.1 gm/dl. The TLC (total leucocyte count) ranged from 12.7 to 32000 × 10^9/ml with mean TLC of 20880±7764 × 10^9/ml.

Table No.1: Laboratory investigations

Investigation type	Minimum	Maximum	Mean	Std. Deviation
Hemoglobin (gm/dl)	5.5	14.0	10.6	2.16096
TLC (× 10^9/ml)	12.7	32000.0	20880.5	7764.15
BSR (mg/dl)	84.0	514.0	282.5	131.91
Urea (mg/dl)	18.00	118.00	49.0	27.25
Creatinine (mg/dl)	.50	2.40	1.3	.54

The blood sugar levels ranged from 84 to 514 mg/dl. On average, the blood sugar level was 282±131 mg/dl. The urea levels varied between 18 and 118 mg/dl. The average urea level was 49±27.2 gm/dl. Additionally, the creatinine levels ranged from 0.50 to 2.4 mg/dl. The average creatinine level was 1.3±0.54 mg/dl.

Outcome: All patients were managed with surgical debridement and antibiotics. 6 (20%) Patients expired; all were > 60 years age. One was 64 years, one was 67 years, 3 were 75 years old and one was 80 years old. All had more than one area of involvement and yielded either Klebsiella or E Coli. 66.7% of those who survived and 66.7% of those who did not survive had diabetes mellitus.

Table No.2: Area of involvement of Fourniers Gangrene

Area involved	Number of patients	Percent
Scrotum alone	23	76.6%
Perineum & scrotum	2	6.7%
Perineum & scrotum & penis	1	3.3%
Perineum & scrotum & penis &suprapubic area	1	3.3%
Perineum & scrotum &suprapubic area	1	3.3%
Scrotum &suprapubic area	1	3.3%
Vulva	1	3.3%

DISCUSSION

FG is a rapidly spreading bacterial infection that affects the areas surrounding the genitals, anus, and perineum[11]. Primarily impacts males, yet can also manifest in females and children[12]. When there is an infection in the genital area, bacteria can spread through different layers of tissue. These layers include Buck's fascia of the penis, Dartos fascia of the penis and scrotum, Colles' fascia of the perineum, and Scarpa's fascia of the front abdominal wall. Fatality rate remains high, ranging from 0% to 67%[13].

In our research, the average age was recorded to be 54.8 years with a standard deviation of 15.19 years. 29 (96.6%) were males and only one (3.3%) was a female. A cause could be traced back in history of only 18 patients, 3 had urethral stone with history of manipulation, one had paraphimosis, one had a insect bite**,** 4 (13.3%) had perineal abscess, 4 (13.3%) had perirectal abscess, 5 (16.7%) had a urethral stricture. Predisposing factors were present in all of them; 20 (66.6%) were diabetic. One (3.3%) had pelvic irradiation for malignancy, extremes of age (age > 70 years was present in 5 (16.6%) patients, 3 (10%) were immunocompromised, 1 (3.3%) had malignancy ie colonic carcinoma, 2 (6.7%) were on chronic steroid use. 12 (40%) had single organism isolated band 11 (36.6%) had polymicrobial infection. The commonest organism isolated was E Coli. The commonest site of involvement was the scrotum alone in 23 (76.6%) patients as shown in Table 2. All patients were managed with surgical debridement and antibiotics. 6 (20%) patients expired.

Similar results were seen in most local studies.

A local study reported 19 male patients, whose average age was 54.7 years with a range of 39 to 68 years, were examined. The causes of the condition were identified between Anus and rectum in 21%, between urinary and genital system in 26.3%, skin in 31.6%, and undetermined in 21% of cases. Comorbidities were present in 57.9% of cases, including conditions like diabetes, chronic kidney disease, undernutrition, liver scarring, and prolonged steroid use. Cultures showed Bacteroides fragilis, E. coli, Streptococci, and Staph aureus.

The treatment strategy involved resuscitating the patient, giving them broad-spectrum antibiotics through an intravenous route, and performing multiple sessions of damaged tissue removal during a hospital stay that lasted for an average of 26 days, with a range of 10 to 52 days. Some patients also received diversion surgeries such as cystostomy (15.8%) and colostomy (5.3%). Reconstruction were done in two cases. The mortality rate was 10.5%, and two patients died due to severe sepsis[14].

Certain underlying health conditions, such as aging, diabetes, excessive drinking, paralysis, or nerve impairment, cancer, weakness, and weakened immune systems contribute to the development of this condition[15]. Injuries to the anorectal, urogenital, and

perineal areas, as well as trauma to the pelvis and perineum or interventions in the pelvic region, are additional factors leading to FG. [16]

Diabetes is reported to be present in 20%–70% of patients with FG[17] and excessive drinking in 25%–50% patients.[18] Similar results were seen our research found that diabetes was the most commonly occurring predisposing condition and urethral stones and strictures were the commonest inciting events. In our study, Diabetes and perianal involvement were the most common involving factors, two out of every three people who survived and two out of every three people who didn't survive had a medical condition called DM. The spread of Human immunodeficiency virus to epidemic levels has put a large population at risk of having FG. [19]

Patients diagnosed with FG in research publications are typically between 46.5 to 63.5 years old.[20] In our research, we determined the average age to be 54.8 years. High mortality rates were observed in older patients in our research; similarly noted by Clayton and colleagues[21].

Our research reveals that there is a mortality rate of 20% associated with FG. Despite advancements in intensive care methods, aggressive wound cleaning, Wound caring has been enhanced, and prolonged course of antibiotics, documented mortality rates for FG vary significantly from 0% to 67%.

CONCLUSION

FG has high mortality. In most patients the scrotum is involved, urhral stictures and stones are the commonest causes and diabetes is the commonest predisposing condition. Polymicrobial infection mostly containing E Coli and Klebsiella are the commonest.

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Original Article

The Effect of Gender on the Linear and Volumetric Changes of Maxillary Permanent Canine Teeth on the Cone Beam Computed Tomography

Hira Manan, Asma Sattar, Munawar Aziz Khattak, Dania Hassan, Bushra Khan and Momena Rashid

ABSTRACT

Objective: This study assessed the impact of gender on the pulp chamber dimensions relative to the tooth crown ratio in permanent maxillary canines using CBCT scans.

Study Design: Cross-sectional study.

Place and Duration of Study: This study was conducted at the Radiology Department of Khyber College of Dentistry and Sardar Begum Dental College, Peshawar, from September 2021 to June 2022.

Methods: Analysis of 180 CBCT radiographs from participants aged 13 to 60 was conducted using non-probability convenience sampling. The study focused on structurally sound maxillary canines, measuring tooth crown length, width, volume, and pulp chamber dimensions. Images were oriented in axial, coronal, and sagittal planes for accuracy. A significance level of $p \leq 0.05$ was applied for statistical analysis.

Results: For males, mean values were: crown length (-0.226), width (-0.096), volume (-0.260), and pulp chamber dimensions (-0.143 length, -0.133 width, -0.100 volume), with a mean ratio of (0.094). For females, mean values were: crown length (0.121), width (-0.148), volume (-0.140), and pulp chamber dimensions (-0.077, -0.072, -0.054), with a mean ratio of (0.051). Significant differences in measurements between genders were noted ($p = 0.004$ for crown; $p = 0.005$ for pulp).

Conclusion: A statistically significant relationship exists between gender and both crown and pulp chamber volumes.

Key Words: Maxillary Canine, Crown volume, Gender, Pulp chamber volume

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INTRODUCTION

Gender determination is the first step in human identity. Forensic professionals find it extremely difficult to determine a person's gender from skeletal remains, particularly when just fragments of the corpse are found. Using the skull and teeth, forensic dentistry can assist in identifying the gender of the remains. The shape, crown size, root lengths, and other characteristics of teeth are specific to males and females.

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Using the teeth and skull, forensic dentistry can help identify the gender of the remains because different aspects of teeth, such as morphology, crown size, root lengths, etc., are characteristic of males and females. By determining their mesiodistal and buccolingual dimensions, teeth can be utilized to distinguish between genders[1,2]. This is especially crucial for young people who have not yet established skeletal secondary sexual traits. Research indicates notable distinctions in the crown dimensions of permanent and deciduous teeth between males and females. It is emphasized that the environment has a significant impact on odontometrics, or tooth size. Because of this, these metrics are population-specific and do not apply to the entire planet[3,4]. Males have larger mandibular canines than females, exhibiting the largest size difference between the teeth. Additionally displaying variations are the maxillary incisors, premolars, and first and second molars[5]. A study on the mesio-distal crown diameter of permanent teeth belonging to Australia's aborigines (those of Aboriginal descent) found gender disparities in tooth sizes. The difference was greatest in the mandibular canines.[6] In a research on Saudi Arabian

population, Abdullah et al. found that although it was not statistically significant, the mean mesiodistal width of maxillary canines was larger in males than in females. In an other study, researcher measured the mesiodistal width of canines in various ethnic groups to study sexual dimorphism. Furthermore, the mandibular canines showed higher levels of sexual dimorphism than the maxillary canines

Male versus female mandibular canine mesiodistal breadth was considerably greater. All these variable lead to sexual dimorphism that are most likely because of the subject's varying ethical background and the use of non-standard assessment techniques. CBCT images of 521 left maxillary and 681 left mandibular canines were obtained from 368 females and 349 males aged between 15 and 65 years in a other study on a local community of Pakistanis[7]. The pulp cavity volume was computed and the pulp shape was traced using Planmeca Romexis software. It demonstrated the correlation (R2 = 0.33, where R2 is the highest prediction power) between the volume and gender of the mandibular canine pulp.

CBCT allows teeth to be seen in three dimensions without the need for magnification, superimposition, or distortion[8] The ability to discern various focus objects from very small distances is one of the most appealing aspects of CBCT imaging, and this is partly due to the capture of isotropic data and flat panel detector technology[9]. CBCT is a simple and conservative method with reasonable accuracy and precision[10].

Like the present study numerous studies have used permanent maxillary canines because the pulp of canines is larger, less wear and a high survival rate than other teeth[11]. Canines are less prone to caries or rot, have a straight root and a wide pulp chamber[12]. Apart from identification, Gender based variable in teeth is also a very concerning topic for practicing dentists. Especially during endodontic treatment where morphological changes are bound to changes the difficulty index as well as the outcome of treatment. A study by Soleymani et al reported the due to the diverse changes possible in the morphology of canine in association with gender they recommended the use of CBCT for assessment during endodontics in their Iranian population[13]. To date, no published data on the subject is available for the local population of Khyber Pakhtunkhwa. This study will help physicians in diagnosis and treatment planning for endodontically compromised teeth i.e., the dentist will have a better understanding of the crown morphology of the tooth and its root canal system and therefore the chances of failure will be avoided.

The primary goal of this study was to use cone beam computed tomography to measure the impact of gender on the length and width of the pulp chamber to tooth crown ratio in permanent maxillary canine teeth in patients visiting Peshawar's dental teaching hospitals between the ages of 13 and 60.

METHODS

180 participants of all genders participated in this cross-sectional study, which ran from September 2021 to June 2022 at the radiology departments of Khyber College of Dentistry and Sardar Begum Dental College in Peshawar. The non-probability convenience sampling technique was used for the sampling process. Participants had structurally good permanent maxillary canines and ranged in age from 13 to 60 years, representing both genders. The subjects' cone-beam computed tomography (CBCT) results, which were available in Digital Imaging and Communication in Medicine (DICOM) File Format, had been recommended by dental clinicians for routine treatment planning.

Inclusion Criteria:

1. Maxillary permanent canines are fully developed and structurally sound (without caries) as seen on CBCT.
2. Crown and root of bilaterally erupted permanent maxillary canines seen on CBCT.
3. CBCT images of both genders females and males having an age group of 13 – 60 years.
4. CBCT images show fully developed roots of permanent maxillary canine with a completely formed root apex.

Exclusion Criteria:

1. CBCT images showing Maxillary canines with pulp stones or calcified canals.
2. CBCT images of permanent maxillary canines having root canal treatment, post and cores build-up, crowns, resorption defects, calcification and fractures.

For the calculation of the linear measurements of permanent maxillary canine, Planmeca Romexis 6thversion software was used. The images were exported in the Digital Imaging and Communication in Medicine (DICOM) file format using the Planmeca Romexis software program. After the CBCT pictures were corrected for brightness, contrast, and sharpness, they were imported as DICOM files into the Mimics program. To determine the tooth crown length, tooth crown width, tooth crown volume and pulp chamber length, pulp chamber width and pulp chamber volume of permanent maxillary canine the image was first oriented properly in axial, coronal and sagittal planes. The image was scrolled on the software's cross-sectional plane to identify the optimal midsagittal section of the pulp after the longitudinal axis of the tooth from the crown tip to root apex was initially established in the sagittal plane. (figure1)

CBCT images were collected from Khyber College and Sardar Begum dental college and hospital prior consent from patients who were already advised CBCT.

Statistical Assessment: SPSS version 22 was used to conduct the statistical analysis. Calculations were made for descriptive statistics such frequency, mean, and standard deviation. Pearson correlation coefficient were used to estimate the correlation between gender and pulp chamber to tooth crown ratio, tooth crown length, tooth crown width, tooth crown volume, and pulp chamber length, pulp chamber width, pulp chamber volume. For the differences to be statistically significant, $P \leq 0.05$ was considered.

RESULTS

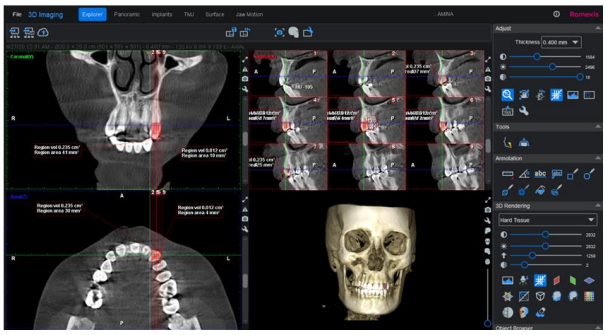

Figure No. 1: Volumetric measurements of the crown and pulp chamber of the permanent maxillary canine.

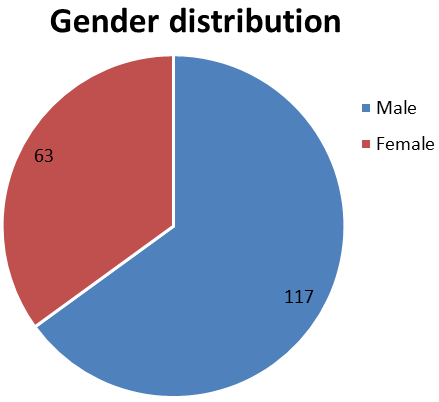

Figure No. 2: Gender distribution

Table No. 1: Distribution characterization for correlation with age.

	Age groups	Tooth Crown Length	Tooth Crown Width	Tooth Crown Volume	Pulp Chamber Length	Pulp Chamber width	Pulp Chamber Volume	Ratio
Mean	13-23	-.068	-.013	-.032	-.080	-.113	-.053	.127
	24-33	-.063	-.012	-.030	-.073	-.104	-.049	.117
	34-43	-.020	-.004	-.009	-.024	-.034	-.016	.038
	44-53	-.009	-.0018	-.004	-.011	-.015	-.007	.017
	54-60	-.005	-.0010	-.002	-.006	-.009	-.004	.010
P - value		.005	.005	.005	.005	.005	.005	.004

DISCUSSION

In the present study, maxillary permanent canines were selected because they often remain unaffected and are well anchored in the jaw for declining years. Has single, straight tooth and wider pulp cavity. The canine crown is designed in a way that promotes cleanliness. With good anchorage in the jaw, this quality of self-cleaning keeps the tooth safe for life. Therefore, canines carry less risk of caries or rot. Such characteristics of the permanent maxillary canine allows an easy approach for the morphological quantification.[14]

In 2019, Kazmi et al. studied a group of 719 Pakistanis. Using Planmeca Romexis software, they obtained CBCT images of 521 left maxillary and 681 left mandibular canines from 368 females and 349 men between the ages of 15 and 65. According to the data, there was a significant difference in pulp volume between the sexes (R2 = 0.3310). Consequently, the results of the most recent study also indicate that the pulp chamber volume of the maxillary canine differs significantly between males (-.100) and females (-.054).[11] They found a decrease in pulp volume with age, but did not determine the rate of change in pulp volume between different stages of age (early, middle, and old age). The present study shows a significant inverse relationship between gender and age of permanent maxillary canine. This is in line with another study conducted on 131 CBCT images of patients aged 17 to 75 years with fully exploding maxillary canines[15] .In this study, Planmeca Pro Max 3D was used to calculate the volume of the pulp and to detect the pulp and tooth pattern on the axial part. The results show that ($r = –0.486$) is most closely related to age. Another researcher conducted a study on 150 sets of CBCT images of mandibular canines in the Egyptian population between the ages of 18 and 70. Sample sizes were divided into 5 age groups. i-CAT scanner used. The pulp and tooth volume ratio and age were shown to be statistically significantly and negatively correlated ($r = -0.869$, $p < 0.001$).

A study on 110 scanned CBCT data of maxillary central incisors (56 men and 54 females) in Malaysia. This study found that pulp chamber/crown had higher coefficients of values for volume analysis (R2 = 0.78) than pulp cavity/tooth (R2 = 0.64)[16]. Researcher

calculated the pulp-to-tooth volume ratio of incisors, canines, and premolars using 111 CBCT images of Belgian patients aged 10 to 65 (57 women and 54 men). Went. Implant Pro software was used. The results indicated that incisors showed the greatest correlation with age (R^2 = 0.41). They found that in females (R2 = 0.38) compared to males (R2 = 0.31), there was a stronger correlation between pulp and tooth volume with age[17].

CONCLUSION

A statistically significant relationship (p = 0.004) was observed between the tooth crown and pulp chamber volume for both males and females.

Conflict of Interest: The study has no conflict of interest to declare by any author.

Author's Contribution:

Concept & Design of Study:	Hira Manan
Drafting:	Asma Sattar, Munawar Aziz Khattak
Data Analysis:	Dania Hassan, Bushra Khan, Momena Rashid
Revisiting Critically:	Hira Manan, Asma Sattar
Final Approval of version:	By all above authors

Conflict of Interest: The study has no conflict of interest to declare by any author.

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Ethical Approval: PRIME/IRB/2021-298 Dated 10.03.2021

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Original Article

Evaluation of Span of House Job and Amount of Experience by Anesthesia House Officers in Lahore

Ghulam Murtaza Hiraj[1], Sohail Anjum[2] and Rizwan Ali Qaiser[3]

ABSTRACT

Objective: Our research study was conducted to evaluate span of house job and amount of experience by anesthesia house officers in Lahore.

Study Design: Cross-sectional quantitative descriptive study.

Place and Duration of Study: This study was conducted at the Teaching Hospital of Amna Inayat Medical College Lahore from May 22, 2023 to November 22, 2023.

Methods: Those house officers who had experience of one month and consented were engaged providing them a self reporting questionnaire. From 53 house officers, a total of 34 surveys were completed out of which there were 25 females (73.52%) and 9 boys (26.47 %), hence making a rate of response 64.15%. Questionnaires filled by them got collected in person.

Results: In our study 15 respondents (44.11%) agreed on the best possible time span for house job in anesthesia to be three months. Eleven officers (32.07%) agreed that anesthesia experience obtained during house job was ample. Twenty two house officers (64.70%) disagreed that anesthesia experience obtained during house job was ample; one house officer (2.94%) gave vague answer.

Conclusion: House officers in anesthesia generally agreed on three month time period of house job in specialty. However they disagreed on the amount of experience achieved.

Key Words: Span, Amount, Anesthesia, Lahore, House job, Evaluation, Experience

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INTRODUCTION

Understanding of the perceptions by house officers for different specialties could be of significance for leaders in health care system for promoting distribution of specialties in order to match increasing requirements of population. In addition institutional management required allied disciplines like anesthesiology to be involved.[1] To understand these perceptions from grass root level we started from a level of house officers. Their perceptions were required to determine that what they thought about time period of their house job whether it was sufficient or not and whether the amount of experience achieved by them was also adequate or not?

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Because at local level we did not see any survey like this and because literature review showed a deficient data in this respect; we conducted this research with the aim to evaluate span of house job and amount of experience by anesthesia house officers in Lahore. Although anesthesia and intensive care units have put a great clinical, administrative and research contribution, very little is acknowledged for practical environment of this subspecialty. There are cognitive and physical restrictions in human beings making them fallible.[2] Therefore current evaluation of clinical practice is mandatory to understand challenges and opportunities faced by critical anesthesia care, satisfaction, patterns of staffing optimization, assessment of sustainability and strategic planning for scope, training and future activities.[3] Six career domains were pointed out to be: sense of wellness, satisfaction of career, leadership and promotion, networking, mentoring, to conceptualize and complete the projects.[4] Increasing training span for trainees in early stage could enhance future recruitments in subspecialty.[5] That is why we focused on time period provided to house officers in the current research that what they comment in this regard. Those policies which increase satisfaction of job should be developed by health leaders simultaneously implementing relation related work practices.[6]To determine satisfaction about amount of experience we focused on it as commented by house officers of

anesthesia department. Anesthesia house officers and trainees are usually under command of multiple senior anesthetists. Thus they develop multiple educational relationships with them during their tenure of training. Scarce data is available which described maintaining and developing such kind of relationships.[7] Our research will provide evaluation of house job by house officers themselves in anesthesia in terms of its time span and in terms of amount of experience achieved.

METHODS

Ethical approval obtained from institution to conduct this cross-sectional quantitative descriptive survey. Study was performed from May22, 2023 to November 22, 2023 on fifty three house officers of teaching hospital of Amna Inayat Medical College Lahore. Those house officers who had experience of one month and consented were engaged providing them a self reporting questionnaire.[1] Number of months in training, age and gender were to be written. Questionnaires filled by them got collected in person. To evaluate span of house job, perceptions were sought. Participation in study was voluntarily and assurance given to keep their responses confidential while no harms and compensatory things assumed. From 53 house officers, a total of 34 surveys were completed out of which there were 25 females (73.52%) and 9 boys (26.47 %), hence making a rate of response 64.15%. ANALAYSIS OF DATA was performed by the use of SPSS.25. Responses frequencies derived and mentioned in graphs.

RESULTS

In our study 15 respondents (44.11%) agreed on the best possible time span for house job in anesthesia to be three months. The rest of the numbers and percentages are given in the Figure1.

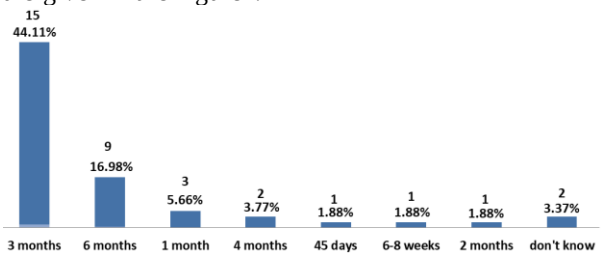

Figure No. 1: Responses of house officers in numbers and percentages about best possible time span of anesthesia house Job

Eleven officers (32.07%) agreed that anesthesia experience obtained during house job was ample. Twenty two officers (64.70%) disagreed; one officer (1%) given vague answer as mentioned in figure 2.

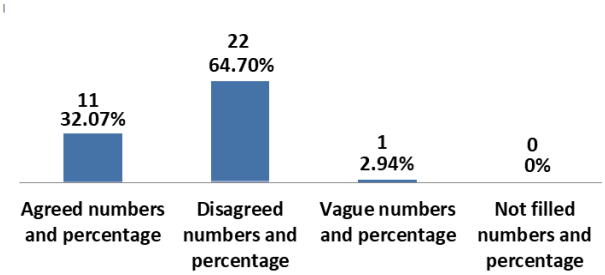

Figure No. 2: Responses of house officers in numbers and percentages about ample amount of anesthesia experience

DISCUSSION

In our study 15 respondents (44.11%) agreed on the best possible time span for house job in anesthesia to be three months. Changed from three months, a six months internship in family medicine was introduced in South Africa in 2021 in 2nd year of a two year program of internship for fresh doctors. This extended the internship platform up to primary health care and small district hospital levels where no interns were sent ever before. A study was also conducted to ascertain its effect on health facilities at district levels in the province of Western Cape. Majority of interns, directors and supervisors commented positively on this change which not only enhanced community health care quality but also likeliness to consider its career in this district.[8] A qualitative study was also performed on nurse anesthetists to determine opinions about enhancement of their clinical reasoning and satisfaction of teaching during their training program.[9] Reasonable efforts were put to shape up specialty through launching innovative programs to address professional difficulties in mentoring forthcoming generations.[10] Skills of literature review, participation in journal club, quality enhancement, critical appraisal and presentation were named to make anesthetist a research "scholar".[11] But in Pakistan, house officers are generally not engaged in these domains of knowledge. Perhaps it may be due to this reason that house officers engaged in our study did not agree on the ample amount of their experience achieved during their house job. Unsustainable behaviours should be addressed via planning and coordination of health care innovations to improve health care effectiveness, outcome and efficiency.[12] Practical scheduling problems of academic anesthesia could be addressed. That required deployment and planning of anesthetists to meet protocols of institution.[13] Factors were also observed for female leadership in anesthesiology.[14] In another study of a medical college, most of the residents wished to join anesthesia career. Interests in traditional subject fellowships were uncommon. Perceived matters were psychological dissatisfaction, changes in health system and competitiveness with none-physician- providers.[15] In our current study house officers too were in

disagreement with the amount of experience they achieved. Similarly resident medical officers were also subjected to research study that explored areas of improvement in their training.[16] Introduction of Entrust able professional activities (EPAs) was an innovation which optimized assessments at workplace-base but even those could not suffice challenges of getting necessary feedback. Anesthesia residents were subjected to EPAs through mobile app and their impact was determined on feedback culture.[17] Common competencies like endotracheal intubation were assessed by evaluation and initial proctoring and renewal on yearly basis with the least number performances to inculcate proficiency.[18] In France anesthesia residents are trained to perform their duties in operation theatres as well as in intensive care units.[19] Studies were also conducted to assess initiatives which promoted diversity and inclusion in anesthesiology academics.[20] A particular research examined how anesthetists could potentiate their role in health care systems.[21] A review summarized current use of the popular app in anesthesiology and the inherent challenges in its implementation for a modern anesthetist.[22] In another study house officers mentioned fatigue to contribute professional errors. Anesthesia providers should be aware of it.[23]All above mentioned factors should be taken into account in this regard. Our study obtained a kind of requisite feed-back form the important most stake holders that are the house officers themselves.

STUDY LIMITATIONS: Our research was limited in the sense that sample of only one teaching hospital of the city was taken. It would have been more elaborative if sample was taken from all teaching hospitals.

CONCLUSION

House officers in anesthesia were generally agreed on three month time period of house job in specialty. However they disagreed on the amount of experience achieved.

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Review Article

The Evolution of Periodontal Disease Classification

Anas Abdul Khader

ABSTRACT

Objective: This study aims to trace the historical evolution of periodontal disease classification systems, analyse contemporary challenges and critiques, and explore future directions for refinement.

Methods: A narrative review was conducted, examining key milestones in the development of periodontal disease classification frameworks from the initial broad categorisations to the comprehensive, evidence-based systems introduced through international workshops in 1989, 1999, and 2017.

Results: Early classifications were based on clinical observations, while later systems incorporated pathological principles, disease etiology, and host response factors. The 1999 system provided a detailed framework accounting for gingival diseases, chronic/aggressive periodontitis, systemic disease associations, and other conditions. The 2017 workshop further refined the classification, introducing a staging and grading system for periodontitis. Contemporary challenges include the complexity of certain gingival conditions, debates surrounding specific categories, and the need for the integration of emerging technologies and research findings.

Conclusion: The evolution of periodontal disease classification reflects our advancing understanding of disease pathogenesis. Continued interdisciplinary efforts, incorporating genetic, microbiological, and host-response research, are crucial for refining the classification system to enable more precise disease stratification, personalised treatment strategies, and improved clinical outcomes.

Key Words: Evolution; Periodontal diseases; Classification

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INTRODUCTION

Periodontal diseases, such as gingivitis and periodontitis, represent a spectrum of inflammatory conditions affecting the periodontium, arising primarily from a dysbiosis of the oral microbiota, with dental plaque as the main etiological factor. The interaction between this microbial biofilm and the body's immune response leads to inflammation and, if unmitigated, to tissue destruction and tooth loss. The clinical course is characterised by episodic activity and quiescence, influenced by a combination of modifiable factors like smoking and non-modifiable factors such as genetics. Genetic predispositions, particularly affecting the immune response, play a crucial role in the severity and progression of these diseases. Moreover, periodontal diseases have been linked to systemic health issues, highlighting the importance of oral health in overall systemic homeostasis.[1] In periodontology, classification systems establish a uniform framework for the diagnosis of conditions such as gingivitis and various stages of periodontitis. The importance of these systems lies in their ability to provide consistent diagnostic criteria, ensuring accuracy and facilitating professional communication among dental practitioners. Furthermore, it enables dentists to customise treatment strategies based on the specific stage and severity of the disease, ranging from enhanced oral hygiene practices in gingivitis to surgical interventions in advanced periodontitis. In the realm of research, these systems are invaluable.[2] They allow for the comparative analysis of various studies and facilitate the identification of distinct subgroups within periodontal diseases. This is crucial in the context of personalized medicine and the development of innovative diagnostic approaches. In essence, periodontal classification systems play a pivotal role in both patient care and the advancement of periodontal research.

The present study conducts a historical analysis of these classification systems within periodontology. The study aims to track the evolution of these diagnostic frameworks, highlighting how the understanding of periodontal diseases has transitioned from an early bifurcation into inflammatory versus degenerative categories, to the current acknowledgement of a multifactorial etiology. By examining the progression of these classification systems, the study aims to reveal how advancements in scientific knowledge have fundamentally altered our comprehension of periodontal disease pathogenesis.

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METHODS

To conduct a literature survey on “The Evolution of Periodontal Disease Classification”, a search was conducted in February 2024 across various electronic databases, including PubMed, SCOPUS, EMBASE, COCHRANE library, and Science Direct. The search utilized MeSH terms/keywords such as "Periodontal disease", "Classification", “History” and "Evolution". In addition to the electronic search, cross-references and textbooks were manually searched for relevant articles. The inclusion criteria included articles published in the English language from February 2010 to February 2024 that fulfilled the study objectives. The article selection process involved assessing the inclusion and exclusion criteria, as well as conducting a quality assessment. Out of the initial 775 articles identified, 67 were selected based on their titles and abstracts. After evaluating the full texts and applying the inclusion and exclusion criteria, 19 articles were chosen for the review, meeting the study's criteria (Figure 1).

Historical Perspective: The chronicles of periodontal disease recognition and management stretch back millennia, with glimpses found in ancient Egyptian and Chinese texts. These accounts suggest an awareness of periodontal disease potentially as early as 5000 years ago. The dawn of modern periodontal literature emerged with Abu I Quasim (Abuccusis) of 10th century Spain. Early attempts at classification, rooted in the 19th century, relied on observable clinical features. Terms like "pyorrhea alveolaris," literally translating to "pus oozing from the alveolus," reflected the prevailing notion of infected bone and influenced treatment approaches for many years. This era lacked a robust scientific foundation, with classifications such as "schmutz pyorrhea" and "paradontal pyorrhea" primarily based on observed characteristics. A paradigm shift occurred in the 1940s with Orban's classification scheme, which introduced pathological principles. This system categorized periodontal disease into "inflammatory," "dystrophic," and "traumatic" categories, gaining wider acceptance within the dental community. The 1960s witnessed a pivotal advancement - the recognition of a spectrum of related yet distinct periodontal diseases. Chronic marginal periodontitis became the primary recognized form, reflecting a move away from a singular disease entity.[3] By the 1970s and 1980s, the American Academy of Periodontology (AAP) classification acknowledged juvenile periodontitis and further sub-classified marginal periodontitis into "adult" and "rapidly progressive" forms. In 1976, a classification system was introduced that incorporated the concept of "host response" in addition to the presence of inflammation. In 1977, the American Academy of Periodontology (AAP) adopted Glickman's Classification, which categorized periodontal diseases based on the age of onset and the rate of progression. In 1986, the World Health Organization (WHO) introduced the Community Periodontal Index of Treatment Needs (CPITN) for epidemiological studies.

In 1989, the World Workshop in Clinical Periodontics, organized by the AAP, introduced a new classification system that categorized periodontal diseases according to their etiology, clinical presentation, and disease progression. The main categories were: Adult Periodontitis (Chronic Periodontitis), Early-Onset Periodontitis (Aggressive Periodontitis), Periodontitis Associated with Systemic Diseases, Necrotizing Periodontal Diseases, Abscesses of the Periodontium, Periodontitis Associated with Endodontic Lesions, and Developmental or Acquired Deformities and Conditions.[4] In 1999, the International Workshop for a Classification of Periodontal Diseases and Conditions refined the 1989 classification system. It introduced new categories, such as Gingival Diseases and Periodontal Diseases of Children and Adolescents.

In 2017, the World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions introduced a new classification system that included peri-implant diseases and conditions and further refined the categories for periodontal diseases.

The 1999 International Workshop for a Classification of Periodontal Diseases and Conditions: The 1999 International Workshop for a Classification of Periodontal Diseases and Conditions introduced a new comprehensive classification system aimed to address the limitations of previous classifications and provide a more detailed framework for categorizing various periodontal conditions. The major categories in the 1999 classification included: Gingival Diseases, Chronic Periodontitis, Aggressive Periodontitis, Periodontitis as a Manifestation of Systemic Diseases, Necrotizing Periodontal Diseases, Abscesses of the Periodontium, Periodontitis Associated with Endodontic Lesions, and Developmental or Acquired Deformities and Conditions.[5] Within these major categories, numerous subcategories were introduced to provide a more detailed and specific classification based on factors such as etiology, clinical presentation, and disease progression.

The 1999 classification system was adopted globally in accredited graduate periodontal programs and board examinations, as it addressed the shortcomings of the previous classification and reflected the advancements in the understanding of periodontal diseases. The introduction of the 1999 classification system represented a significant milestone in the field of periodontics. These classification systems aimed to provide a standardized framework for diagnosing, understanding, and treating periodontal diseases,

reflecting the evolving knowledge and research in the field.[6]

Gingival diseases were categorized into dental plaque-induced and non-plaque-induced lesions. Chronic periodontitis was categorized based on the severity of clinical attachment loss (CAL) into slight, moderate, or severe forms, with each form further subdivided into localized or generalized presentations. Similarly, aggressive periodontitis was categorized based on CAL and localized or generalized patterns. The classification accounted for periodontitis as a manifestation of systemic diseases, including subcategories associated with haematological disorders, genetic disorders, and unspecified systemic conditions. Necrotising periodontal diseases were classified into necrotising ulcerative gingivitis and necrotizing ulcerative periodontitis. Abscesses of the periodontium were divided into a gingival abscess, periodontal abscess, and peri coronal abscess categories.[7] Periodontitis associated with endodontic lesions encompassed combined periodontic-endodontic lesions. The developmental or acquired deformities and conditions category included various local factors related to teeth and restorations, mucogingival deformities, and occlusal trauma. These comprehensive categories aimed to address the shortcomings of previous classification systems by providing a more detailed and clinically relevant framework for diagnosing and understanding the diverse range of periodontal diseases and conditions.

The 1999 classification system had a significant positive impact on both clinical practice and research in the field of periodontics. In clinical settings, it became the official terminology adopted by the American Academy of Periodontology (AAP). While it did not change insurance coding for billing periodontal treatments, the new detailed categories allowed for better communication and a more continuous understanding of the range of periodontal conditions. The inclusion of an expanded section on gingival diseases was also an important development.[8] For research, the comprehensive framework provided by the 1999 classification enabled more organized and comparable study of periodontal disease data across different regions. Researchers could categorise and analyse findings in a more standardized manner, improving research quality and collaboration.

The 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions: In 2017, the field of periodontology witnessed a landmark advancement with the introduction of a revised classification system by the American Academy of Periodontology (AAP) and the European Federation of Periodontology (EFP). This novel framework addressed the inherent limitations of the 1999 classification system, offering a more robust and comprehensive approach to diagnosing and managing periodontal diseases. This new approach sought to create a more encompassing nosology for periodontal pathologies. The scope of the classification was expanded to encompass not only established periodontal diseases but also peri-implant diseases and conditions. This broader perspective reflects the evolving understanding of oral health and the challenges associated with Osseo-integrated implants.[9]

The 2017 system incorporates detailed information on established risk factors such as cigarette smoking, a well-documented contributor to periodontal disease progression. Additionally, it considers a patient's specific response to periodontal therapy, paving the way for the development of individualized treatment plans. Furthermore, the revised classification emphasizes understanding the etiologic factors of periodontal diseases. This deeper understanding of the disease pathogenesis empowers periodontists and general dentists for more effective management strategies and to develop optimal treatment plans for individual patients. This shift towards a more personalized, evidence-based approach has the potential to significantly improve clinical outcomes and patient well-being.

This revised framework incorporates several key changes and additions; Stage and Grade Refinement where all three previously recognized forms of periodontal disease (chronic, aggressive, and periodontitis as a manifestation of systemic diseases) have been recategorized into a more nuanced system incorporating stages and grades. This allows for a more precise assessment of disease severity and progression. Reflecting the growing use of dental implants, the 2017 classification now encompasses peri-implant diseases and conditions. This inclusion equips clinicians with the necessary tools for diagnosing and managing these implant-related complications.[10] Recognizing the wider spectrum of potential pathogens, the classification incorporates specific categories for fungal and viral infections. This allows for a more targeted approach to treating these less common infectious etiologies. The 2017 system eliminates redundant categories like "Erythema Multiforme" and "Drug-induced" gingivitis. Additionally, it simplifies the terminology for necrotizing ulcerative gingivitis/periodontitis by removing the "ulcerative" descriptor and replacing it with just "necrotizing gingivitis" and "necrotizing periodontitis". The new classification introduces the term "necrotizing stomatitis," acknowledging this distinct inflammatory condition affecting the oral mucosa. The previous distinction between "chronic" and "aggressive" periodontitis has been replaced with a new grouping under the broader category of "periodontitis." This reflects a more nuanced understanding of the disease process, where factors like disease course and host response play a crucial role in classification.[11]

Table No.1: Comparison of Periodontal Disease Classification Systems

Classification System	Period	Scope	Defining Criteria
Orban's Classification	1940s	Periodontal diseases	Categorized periodontal diseases into "inflammatory," "dystrophic," and "traumatic" based on pathological principles.
Glickman's Classification	1977	Periodontal diseases	Based on the age of onset and rate of progression, sub-dividing periodontitis into "adult" and "rapidly progressive" forms.
WHO CPITN	1986	Epidemiological studies	Community Periodontal Index of Treatment Needs (CPITN) to assess periodontal health on a community level.
AAP 1989 Workshop	1989	Clinical presentation of periodontal diseases	Introduced a new classification system categorizing periodontal diseases by etiology, clinical presentation, and disease progression. Major categories included Adult Periodontitis (Chronic), Early-Onset Periodontitis (Aggressive), Periodontitis Associated with Systemic Diseases, and others.
AAP 1999 Workshop	1999	Refinement of periodontal disease classification	Refined the 1989 system and introduced new categories such as Gingival Diseases, Chronic Periodontitis, Aggressive Periodontitis, Periodontitis as a Manifestation of Systemic Diseases, and others.
AAP/EFP 2017 Workshop	2017	Periodontal and peri-implant diseases and conditions	Introduced staging and grading for periodontitis, covering all forms of periodontal disease. Included peri-implant diseases and conditions. Emphasized risk factors, etiology, and host response. Introduced stages and grades to determine severity and risk of progression.

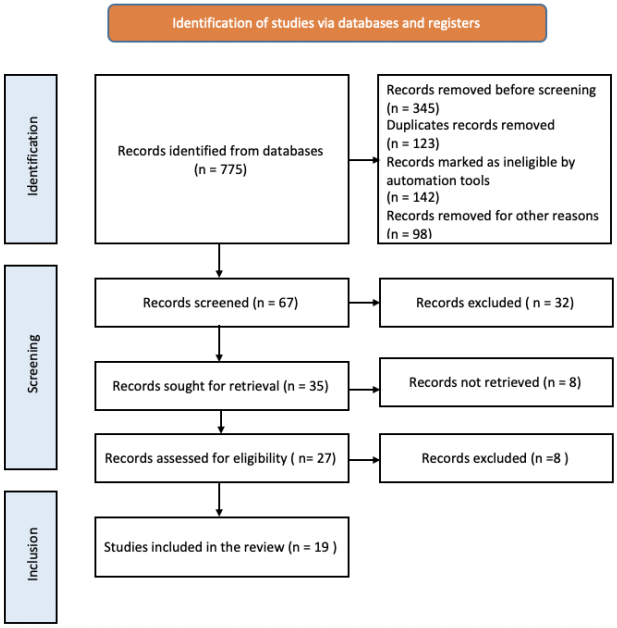

Figure No.1: Flowchart showing the step-by-step identification of the studies via databases

The staging and grading system for periodontitis in the new 2017 classification framework for periodontal diseases, incorporates a multi-dimensional staging and grading system for periodontitis. The staging component primarily assesses the severity and extent of the current periodontal destruction and complexity of disease management. It is determined by factors such as clinical attachment loss (CAL), radiographic bone loss (RBL), probing depth (PD), and presence of vertical and horizontal osseous defects, furcation involvement, tooth hypermobility, and ridge defects. The distribution of these lesions across the dentition is also considered. Stages range from the initial Stage I to the most severe Stage IV periodontitis.

Grading, on the other hand, evaluates the potential future progression of the disease based on the evidence of progression rate in the past, anticipated response to standard periodontal therapy, and the influence of risk factors. It incorporates direct evidence of progression rate from longitudinal records, as well as indirect evidence from clinical and radiographic findings and risk factor assessment. The three grades - A (slow progression), B (moderate progression), and C (rapid progression) - provide insights into the likely aggressiveness and treatment responses.[12] The grading process accounts for the modulating effects of risk factors, with a specific emphasis on smoking and diabetes as potential contributors to accelerated progression and impaired healing responses. These risk factors can influence the final grade assigned and may necessitate more intensive treatment and monitoring protocols.

By integrating both the current severity (staging) and future risk dimensions (grading), this multifaceted

system facilitates a comprehensive assessment of individual periodontitis cases, enabling more personalized treatment planning, prognostic evaluations, and targeted preventive strategies. The expanded scope, including peri-implant conditions, equips practitioners with tools for diagnosing and managing implant-related complications, reflecting the increasing use of dental implants.[13]

For research, the updated classification offers a standardized and globally accepted terminology, facilitating consistent data reporting and cross-study comparisons. The emphasis on etiologic factors and host response paves the way for investigations into disease mechanisms, biomarkers, and targeted therapies. Collaborative research efforts across disciplines can leverage the classification system to advance our understanding of periodontal and peri-implant disease pathogenesis, ultimately informing evidence-based clinical decision-making and improving patient outcomes.

In the 2017 classification of periodontal and peri-implant diseases and conditions, a significant addition was the category of "clinical health." This category was introduced to address the limitations of the previous system, which often led to the misdiagnosis of cases as either gingivitis or periodontitis. By recognizing clinical health, the revised classification provides a framework for identifying and managing cases where the periodontal tissues are healthy, thereby preventing unnecessary treatment for conditions that do not exist.

The 2017 classification acknowledges that clinical health can exist in both the periodontium (the structures that support the teeth) and peri-implant tissues (the tissues surrounding dental implants). This differentiation helps clinicians accurately diagnose the health status of these tissues and apply appropriate preventive and maintenance strategies. The inclusion of clinical health as a distinct category underscores the importance of recognizing and preserving healthy periodontal and peri-implant conditions, which is essential for overall oral health and effective long-term management of periodontal diseases.

Contemporary Challenges and Critiques: The 2017 World Workshop on the Classification of Periodontal and Peri-Implant Diseases and Conditions provided an updated framework for classifying gingival diseases. While this classification system represents a significant advancement, there are ongoing challenges in its application in clinical settings, as well as critiques and debates surrounding specific categories or criteria. Moreover, emerging technologies and scientific discoveries play a crucial role in addressing these challenges and refining the classification system.

One of the primary challenges in applying the current classification is the inherent complexity and overlap of certain gingival conditions. For instance, differentiating between plaque-induced and non-plaque-induced gingival lesions can be complicated in cases where multiple etiological factors are involved. Additionally, the clinical manifestations of some gingival diseases may exhibit similarities, making definitive diagnosis based solely on clinical presentation a challenge. There have been critiques and debates surrounding specific categories within the gingival disease classification.[14] For example, the categorisation of certain lesions as "non-plaque-induced" has been questioned, as the role of the biofilm in the pathogenesis of these conditions may have been underestimated. Furthermore, the criteria for distinguishing between different subcategories, such as the various forms of desquamative gingival lesions, have been subject to ongoing discussions and refinements.

Emerging technologies and scientific discoveries have the potential to address these challenges and refine the classification system. Advances in molecular diagnostics, including the application of genomics, transcriptomics, and proteomics, can provide valuable insights into the underlying pathogenic mechanisms of gingival diseases. These technologies may facilitate the identification of specific biomarkers or molecular signatures that can aid in more accurate diagnosis and classification. Furthermore, the integration of novel imaging modalities, such as advanced optical coherence tomography (OCT) or multiphoton microscopy, may enable enhanced visualisation and characterisation of gingival lesions, potentially revealing subtle differences that could inform classification refinements.[15]

Longitudinal studies and large-scale epidemiological data analyses, facilitated by electronic health records and data-sharing initiatives, can shed light on the natural history, risk factors, and clinical outcomes of various gingival diseases. This information can be instrumental in validating or refining the existing classification criteria. Collaborative efforts among clinicians, researchers, and professional organizations are crucial in addressing these challenges.[16] Regular reassessments of the classification system, incorporating the latest scientific evidence and clinical experiences, will be essential to ensure its continued relevance and applicability in diverse clinical settings.

By embracing emerging technologies, fostering interdisciplinary research, and encouraging open scientific discourse, the dental community can work towards a more comprehensive and accurate classification of gingival diseases, ultimately enhancing our ability to provide targeted prevention, diagnosis, and management strategies for these prevalent oral health conditions.

FUTURE DIRECTIONS

Potential areas for refinement in the classification of periodontal diseases include re-evaluating the sub-classification of chronic and aggressive periodontitis based on disease progression patterns and risk factors. Additionally, the classification of periodontitis associated with systemic diseases may require updates as new systemic links are established through research. Furthermore, incorporating genetic risk stratification, microbial profiles, and host-response biomarkers into the classification criteria could enhance disease characterization and personalized treatment approaches. Regular reassessments and interdisciplinary

collaborations are crucial to ensure the classification system remains clinically relevant and aligned with the latest scientific advancements in the field.[17]

Genetic studies could lead to classifying periodontal diseases based on specific genetic profiles associated with disease susceptibility or progression patterns. High-throughput microbiological techniques may uncover new microbial communities implicated in distinct clinical presentations, necessitating new categories or subcategories. Research on host-response mechanisms, including immune regulation, inflammation, and tissue repair, could identify biomarkers or molecular signatures characteristic of different periodontal disease phenotypes. Integrating such genetic, microbiological, and host-response data into classification criteria may enable more precise disease stratification and personalized treatment strategies. Continued research in these areas is crucial for refining future periodontal disease classifications to reflect our evolving understanding of disease pathogenesis.[18]

Refining the classification of periodontal diseases requires interdisciplinary collaboration among clinicians, researchers from genetics, microbiology, immunology, and epidemiology.[19] Achieving international consensus through collaborative efforts between professional organizations, academic institutions, and global stakeholders is crucial for widespread acceptance and adoption of an updated, universally applicable classification system.

CONCLUSION

The classification of periodontal diseases has significantly evolved, transitioning from broad clinical observations to evidence-based frameworks, notably through milestones like the 1989 and 1999 international workshops. These advancements enhance diagnosis, research, and management by providing standardized terminology, aiding communication, facilitating comparative studies, identifying risk factors, and guiding tailored interventions. Without refined classification schemes, addressing these prevalent oral health issues would be hindered. Yet, achieving an optimal system is an ongoing process, necessitating adaptation to emerging scientific insights on disease mechanisms, biomarkers, and treatments.

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